

1975-76 Graduate Catalog

West Virginia University Bulletin





**WEST VIRGINIA
UNIVERSITY**

**1975-76
Graduate Catalog**

UNIVERSITY CALENDAR

First Semester, 1975-76

August 24, Sunday, to August 26, Tuesday, incl.....	Freshman Orientation
August 25, Monday.....	General Registration
August 26, Tuesday.....	General and Freshman Registration
August 27, Wednesday.....	First Classes
September 1, Monday.....	Labor Day Recess
September 24, Wednesday.....	Beginning of Pre-Registration
October 7, Tuesday.....	Faculty Assembly Meeting
October 18, Saturday.....	Mid-Semester
October 24, Friday.....	Mid-Semester Reports Due
November 26, Wednesday, to	
November 30, Sunday, incl.....	Thanksgiving Recess
December 12, Friday.....	Last Classes
December 15, Monday, to	
December 20, Saturday, incl.....	Final Examinations
December 21, Sunday, to January 4, Sunday, incl.....	Christmas Recess

Second Semester, 1975-76

January 5, 6, Monday and Tuesday.....	General Registration
January 7, Wednesday.....	First Classes
February 7, Saturday (not a holiday).....	West Virginia University Day
February 11, Wednesday.....	Beginning of Pre-Registration
February 16, Monday.....	Washington's Birthday Recess
February 28, Saturday, to March 7, Sunday, incl.....	Spring Recess
March 3, Wednesday.....	Mid-Semester
March 10, Wednesday.....	Mid-Semester Reports Due
April 13, Tuesday.....	Faculty Assembly Meeting
April 19, Monday.....	Easter Recess
April 30, Friday.....	Last Classes
May 3, Monday, to May 8, Saturday, incl.....	Final Examinations
May 10, Monday.....	Grade Reports for Graduating Seniors and Graduate Students Due in Dean's Office
May 11, Tuesday.....	Dean's Report of Graduates Due in Office of Admissions and Records
May 15, Saturday.....	Alumni Day
May 16, Sunday.....	Commencement

Summer Session, 1975

June 16, Monday.....	Registration for First and Second Terms and Nine-Week Courses
June 17, Tuesday.....	First Classes, First Term
July 4, Friday.....	Independence Day Recess
July 16, Wednesday.....	Last Classes, First Term
July 17, Thursday.....	Registration for Students Attending Second Term Only
July 17, Thursday.....	First Classes, Second Term
August 15, Friday.....	Last Classes

*The academic year is divided into two semesters of approximately seven-
teen weeks each and a summer session.*

It is the policy of West Virginia University to provide equal opportunities to all prospective and current members of the student body, faculty, and staff on the basis of individual qualifications and merit without regard to race, sex, religion, age, or national origin.

The University also neither affiliates with nor grants recognition to any individual, group, or organization having policies that discriminate on the basis of race, religion, age, or national origin.

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CONTENTS

Administrative Officers of WVU.....7

Part 1 — General Information.....9

Part 2 — Academic Information.....17

Part 3 — Financial Information.....37

Part 4 — Graduate Programs and Courses of Study.....51

 College of Agriculture and Forestry.....53

 College of Arts and Sciences.....73

 College of Business and Economics.....141

 Creative Arts Center.....151

 College of Engineering.....167

 College of Human Resources and Education.....203

 School of Journalism.....247

 Medical Technology.....253

 College of Mineral and Energy Resources.....257

 School of Pharmacy.....263

 School of Physical Education.....265

 School of Social Work.....273

Part 5 — Graduate Faculty.....283

Part 6 — School of Dentistry.....303

Part 7 — Medical Center Basic Sciences.....321

Part 8 — School of Medicine.....329

Part 9 — College of Law.....357

Part 10 — Interdepartmental Programs.....373

 African Studies.....373

 Center for Appalachian Studies and Development.....377

 Life Sciences.....380

Index.....381

WVU Office of Publications
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West Virginia University is a member of the North Central Association of Colleges and Secondary Schools. The University's educational programs are accredited by the North Central Association and by the appropriate accreditation agencies for the professional schools.

Part 1

GENERAL INFORMATION

Opportunity is what West Virginia University is all about . . . opportunity for people to realize their potential regardless of family income, race, religion, age, sex, or national origin. Through the educational and cultural opportunities it provides, WVU helps people to find satisfying careers as well as to better understand life and themselves.

This is the unique land-grant tradition to which WVU belongs . . . one of only 71 such institutions serving the nation, which have been described as "people's universities for people's problems." They are called land-grant institutions because the Congressional act gave federally owned land to each state that then sold the land and used the funds to begin a college which offered programs in agriculture and engineering.

Since its founding in 1867, WVU has developed into a comprehensive university, offering 196 degree program majors in 16 schools and colleges, and it has become the center of graduate and professional education, research, and extension programs in West Virginia. It is this intellectual variety and mix that makes WVU an exciting institution with an abundance of options for its more than 17,000 students on the Morgantown campuses.

The concentration of University programs in one location, including the WVU Medical Center, results in a wider choice of courses as well as opportunities for interdisciplinary learning and research. For example, faculty and students in electrical engineering and speech pathology and audiology have collaborated in developing and using electronic teaching aids for children with hearing impairments.

Although located in a small city in the Appalachian Mountains, WVU is a cosmopolitan community with students from the 49 other states and 50 foreign countries. Many students are from families with modest incomes. They can afford to attend WVU because it ranks among the ten institutions of its kind in the nation with the lowest charges for state residents. About 35 percent of WVU's students also receive some financial aid. And WVU has sent 17 Rhodes Scholars to Oxford University in Great Britain, far more than universities in neighboring states. More than half of the faculty members have doctoral degrees. They are graduates of 400 American colleges and universities and 75 foreign institutions. The faculty-student ratio is 1 to 19.

WVU offers its students a variety of off-campus learning experiences — working in a state mental hospital and with social welfare agencies; touring the state with the only free traveling puppet mobile in the United States or with performing musical groups; summer overseas programs including foreign language courses in France, West Germany, and Colombia, and a European tour in the humanities; a semester in the coal-mining region of Wales, England, for social work graduate students; seaside biology and geology courses at Lewes, Del., and Wallops Island, Va., through the Marine Science Consortium, and geology classes at the Florida Keys; a U.S. tour in agriculture; and a program in Renaissance and eighteenth century studies at the Folger Shakespeare Library in Washington, D.C.

West Virginia University provides outstanding facilities for its students and faculty including the Library, which contains more than a million items and

7,000 periodical titles, and the Computer Center, which has a \$3.5 million, third-generation computer. There are branch libraries and computer terminals on all the campuses. WVU's growth in physical facilities since 1958 has been equaled by few universities of its size in the nation. More than \$100 million in new buildings have been constructed, including one of the nation's finest creative arts centers.

The campuses in Morgantown contain 60 buildings on 610 acres. A University-operated, inter-campus bus system connects the campuses and an internationally unique Personal Rapid Transit System — featuring small automated cars operated by computers — is being completed between downtown Morgantown and the campuses. The system, which is being built by the U.S. Department of Transportation as a research and demonstration project, hopefully will relieve traffic congestion and critical parking problems on the Downtown Campus and at the Medical Center.

The WVU Center for Appalachian Studies and Development, organized in 1963, has pioneered nationally in broadening the role of the Cooperative Extension Service from strictly agricultural education to community development. The Appalachian Center takes educational opportunities to the people through six area centers and offices in the fifty-five West Virginia counties. All of WVU's colleges and schools also are involved in off-campus programs, which have been recognized nationally for developing new approaches in such fields as rural development, drama, a master's degree in business administration offered primarily through videotaped and live telelectures, and the School of Nursing telelecture system that connects 71 health centers in 44 communities with the WVU Medical Center.

For research and teaching purposes, WVU operates nine experiment farms in Hardy, Jefferson, Mason, Monongalia, and Preston counties; five forests in Greenbrier, Monongalia, Preston, Randolph, and Wetzel counties; a biological station near Terra Alta; a geology camp near White Sulphur Springs; and state 4-H facilities at Jackson's Mill.

Other WVU branches include the Charleston Division of the Medical Center, the Greenbrier Valley Extension Center at Lewisburg, and Potomac State College at Keyser, which is a junior college offering two-year programs.

Government and Organization of WVU

The *West Virginia Board of Regents* is vested by law with authority for the control and management of the University and all other state institutions of higher education. Serving on the Board are nine members appointed by the Governor with advice and consent of the Senate. The State Superintendent of Schools is an ex officio member. The seven members of the WVU Advisory Board are appointed by the Board of Regents to serve as consultants to the president.

The president, appointed by the Board of Regents, is the chief executive officer of the University as well as its principal academic officer, a role which his position as presiding officer of the University Senate symbolizes. The president's office staff includes the provosts and assistants to the president.

The *University Senate* is the vehicle for faculty participation in the government of the University. It is a legislative body with original jurisdiction over all matters of academic interest and educational policy that concern the entire University or affect more than one college, school, or division. The senate's decisions are subject to review and approval by the president and the Board of

Regents. The senate includes the president of the University as chairman, provosts, academic deans, five administrative officers appointed by the president, and senators elected by members of the University Faculty Assembly to represent their college and other constituencies. Each constituency is entitled to one senator for each twenty constituents who are members of the University Faculty Assembly. The senate normally meets once each month.

The *University Faculty Assembly* includes the president of WVU as presiding officer, provosts, academic deans, professors, associate professors, assistant professors, and instructors holding appointments on a full-time basis. The Faculty Assembly normally meets twice a year.

West Virginia University also has a tradition of strong *Student Government* that touches all aspects of student life and represents student opinion to the administration and faculty. Student administration has two main branches: the Executive and the Board of Directors (a policy setting group composed of thirteen members and functions in the dual role of a legislative and judicial arm of student administration). More than 100 students also serve on 50 University committees including the University Senate committees, Committee on Student Discipline (two student members and three faculty members) and the Mountain-lair Advisory Council (four students and four faculty members).

For non-teaching employees, there is the Staff Council, which consists of twelve members elected by their fellow employees in six occupational groups, and International Laborers Union Local 814, AFL-CIO, which represents many employees.

Morgantown Area

Morgantown has a population of 29,000; Monongalia County, 64,000. Monongalia is one of the largest deep-mine coal-producing counties in the nation, with production exceeding ten million tons annually. WVU is the largest single employer.

Located on the east bank of the Monongahela River, which flows north to Pittsburgh, Pa., Morgantown is situated on rugged terrain of the Appalachian Highlands. The altitude of the city varies from 800 to 1,150 feet above sea level, while the surrounding hills rise eastward to Chestnut Ridge and reach an altitude of 2,600 feet just ten miles from the city.

The area's temperate climate is marked by four distinct seasons of about equal length. Morgantown's valley location allows it to usually escape the extremes of winter — downtown snowfall averages 25 inches annually and cold waves, which average about three a year, are blunted by the hilly terrain. Heavy winter clothing isn't usually needed until after Thanksgiving.

Morgantown is served by Greyhound bus and by Allegheny Airlines.

A new north-south interstate highway, I-79, is just one mile west of Morgantown. U.S. Routes 19 and 119 pass through Morgantown in the north-south direction. Construction of U.S. 48, a four-lane, east-west highway, is under way. It will tie I-79 and I-81 together between Morgantown and the Cumberland-Hagerstown, Md. area. Pittsburgh is 65 miles north of Morgantown.

Because of WVU's intellectual resources, the Morgantown area is becoming the major research center in the Appalachian region. Four federal agencies have research facilities in the area — the Department of Health, Education, and Welfare (the Appalachian Center for Occupational Safety and Health), the Forest Service (the Forestry Sciences Laboratory), the Morgantown Energy Research Center of the U.S. Bureau of Mines, and the Soil Conservation Service

(West Virginia headquarters). The American Association of Cost Engineers moved its national headquarters to Morgantown primarily because of WVU's computer and other resources.

Two installations add to the area's variety. They are the Robert F. Kennedy Youth Center, a model rehabilitation facility for youths who violate federal laws, and an earth tracking station of the Communications Satellite Corporation in neighboring Preston County (its 97-foot antenna sends and receives world-wide telephone and other communications from satellites in outer space).

Living Accommodations

The University Housing Office, 440 Medical Center Drive (phone 304/293-3621), is a source of information concerning both University and privately owned off-campus housing. The University maintains nine residence halls. It also operates 354 furnished and unfurnished apartments for married students, graduate students, faculty, and staff.

You should make arrangements for housing well in advance of the semester in which you enroll.

Parking is extremely limited on the University's Downtown Campus and at the Medical Center.

WVU Library System

The West Virginia University Libraries contain over one million items including approximately 800,000 physical volumes, 45,000 reels of microfilm, and 500,000 microforms. Some 30,000 volumes are added each year, and over 7,000 periodical titles are currently received.

The collections are especially strong in the biological sciences, chemistry, engineering, sociology, Africana, the Southern Appalachians, and West Virginia history. Facilities for research in West Virginia and regional history are centered in the West Virginia Collection. In addition to an extensive collection of books, periodicals, and maps, the Collection contains over three million manuscripts. These, together with court records from many counties, are invaluable sources for the study of all aspects of West Virginia history.

The Rare Book Room contains an unusually fine collection of first and limited editions, including the four Shakespeare folios, and the first editions of many of the works of Dickens, Scott, and Clemens.

The Agriculture-Engineering Library, located on the second floor of the Engineering Sciences Building, contains 56,000 volumes. A public card catalog is maintained. In addition, cards for titles in the library are filed in the central Library catalog and are marked "Ag-Eng."

The Physical Sciences Library of 30,000 volumes is located in the Chemistry Research Laboratory. The 90,000-volume Law Library is located in the Law Center. The Mathematics Library in Eiesland Hall has 9,000 volumes.

The Medical Center Library on the second floor of the Basic Sciences Building contains 96,000 volumes with a complete public catalog. Author cards for titles in the Medical Center Library appear in the central Library catalog.

A Music Library of approximately 6,000 volumes and an equal number of scores is located in the Creative Arts Center.

The WVU Library, in cooperation with the WVU Foundation, Inc., publishes books primarily of regional interest but occasionally of international



WVU Library.

scholarly concern (such as the basic historical documents in the *Archives of British History and Culture* series).

Computer Center

The Computer Center is located at 837 Chestnut Ridge Road, directly across from the Medical Center heating plant. The equipment configuration includes an IBM 360/75 large scale general purpose electronic digital computer with 1024K bytes of high speed 4-way interleaved core memory and 1024K bytes of low speed core storage; two 3.9 million byte magnetic drums, seventeen removable 29 million byte magnetic disk drives; one 7-track and two 9-track magnetic tape drives; two 1,100 lines-per minute chain drive printers; one card read/punch device rated to read 1,000 cards per minute and punch 300 cards per minute; and teleprocessing control devices to simultaneously support four high

speed remote batch terminals and thirty-five low speed terminals throughout the campus.

Services offered by the Computer Center include:

Seminars — are conducted regularly on such topics as computer fundamentals, languages, and using the library programs. Special requests for seminars may be made through the Academic Services section. Scheduled seminars are announced in the Computer Center newsletter.

Library of General Purpose Programs — These include the WVU Statistical Monitor (SOS), the North Carolina State Statistical Analysis System (SAS), the BMD statistical package developed at UCLA, the IBM Scientific Subroutine Package, and many other programs and subprograms to support the research efforts of users. User documentation for these programs may be obtained through the Information Controller at the Computer Center. Abstracts of all systems, programs, and subprograms also are available.

Consulting — is available to users through the Academic Services section. Program consultants are available at the Computer Center during normal working hours. A statistical consultant is available by appointment during normal working hours. These consultants are qualified to answer questions about system requirements, language specifications, Computer Center procedures, and general programming and data processing considerations. In addition, they each have special areas of interest and competence that may be relevant to particular user needs.

Test Scoring — by optical page reader is available to all faculty members. The facility includes the capability of summarizing test results by class section and across all sections, of using more than one test key, and of performing a simple item analysis of the test.

Programming — is not generally done by Computer Center personnel for specific users. It is a full-time job to develop and maintain a general-purpose program library for all users. However, if a user has a programming need of sufficient generality, it will be considered by the Academic Services programming staff. Alternatively, the Computer Center Information Controller maintains a list of available student programmers. Users are expected to make their arrangements with student programmers.

Veterans

Information regarding educational opportunities made possible at WVU through provisions of the Veterans Readjustment Benefits Act of 1966 — G.I. Bill (Public Law 358), the Vocational Rehabilitation Program of the Veterans Administration (Public Law 16), and the War Orphan's Educational Assistance Act of 1956 (Public Law 634) may be obtained from the Veterans Counselor by personal conference at his office in Mountainlair or by mail. An Amendment to Public Law 634, enacted in 1964, provides benefits to many dependents of 100 percent disabled veterans.

Foreign Students

All new foreign students must contact the Foreign Student Office in Moore Hall when they first arrive. The Foreign Student Adviser is available for guidance and counseling. Foreign students are encouraged to join the International Students' Association, an organization of foreign and American students interested in international relations. They also are encouraged to join their particular

nationality organizations. The Host Family Program provides foreign students an opportunity to meet and become acquainted with American families and visit in their homes.

All inquiries and applications from foreign students must be sent to the Dean of Admissions and Records. The "Test of English As a Foreign Language" (TOEFL) must be taken by all foreign students before they can be admitted to WVU.



WVU Computer Center.

Part 2

ACADEMIC INFORMATION

The Graduate School, as distinct from other colleges and schools, is University-wide, drawing together all the faculties and students of the University concerned with graduate study, and is empowered to establish policies and regulations covering the introduction of degree programs; degree, curricular, thesis, and dissertation requirements; standards of student scholarship; residency rules, etc., which take precedence over the policies and rules of particular colleges, schools, and departments.

All decisions on major policies and regulations affecting graduate study and the introduction of new degree programs are based on recommendations made by the Graduate Faculty, after study and advice by the Executive Committee of the Graduate Faculty and the Dean of the Graduate School. Responsibility for determining graduate faculty membership and associate membership is essentially in the hands of the Executive Committee, acting on recommendation from the staff member's department chairperson. The Executive Committee consists of ten members, the Dean of the Graduate School, *ex officio*, and nine graduate faculty members elected at large by the graduate faculty for staggered terms of three years. The Executive Committee normally meets once a month and calls meetings of the Graduate Faculty twice during the academic year.

In practice, much of the day-to-day administration of graduate study is conducted by the chairpersons or graduate advisers responsible for the particular programs. At the University level, responsibility for administration of the graduate faculty's policies and regulations, resolving problems of interpretation of these rules, keeping student records, and preparing graduation lists is vested in the Dean of the Graduate School (Graduate School Office, Room 103, Old Law Building).

Graduate School Executive Committee

Stanley Wearden, Ph.D., (*ex officio*), *Dean (Chairman)*

Edward F. Byars, Ph.D., *Professor of Mechanical Engineering and Mechanics* (1976)

Linda Butler, Ph.D., *Associate Professor of Entomology* (1976)

Thomas C. Campbell, Jr., Ph.D., *Professor of Economics* (1975)

Urban Couch, M.F.A., *Professor of Art* (1976)

Paul W. DeVore, Ph.D., *Professor of Education* (1974)

William W. Fleming, Ph.D., *Professor of Pharmacology* (1974)

Hunter P. McCartney, Ph.D., *Professor of Journalism* (1975)

B. Jack McCormick, Ph.D., *Professor of Chemistry* (1974)

Frank D. O'Connell, Ph.D., *Professor of Pharmacognosy* (1975)

Nonacademic policies and regulations affecting students are summarized in the *Student Handbook*. Every student is urged to obtain a copy of the *Student Handbook* from the Office of Student Educational Services, 109 Martin Hall.

Student Financial Aids

Information and guidance on loans for graduate students are available in the Financial Aids Office, Mountainlair.

On-campus employment opportunities can be investigated at the Financial Aids Office and the WVU Personnel Office, 511 North High Street.

Information concerning fellowships and/or assistantships may be obtained from respective department chairpersons.

Admission to Graduate Programs

General

Prospective graduate students are urged to initiate their admission applications as early as possible. January application is not unreasonably early for first semester admission.

Applications for admission to the Graduate School must be made on standard forms provided by the Office of Admissions and Records. Applications must be submitted to the Office of Admissions and Records, not to the Graduate School Office. Completed forms must be accompanied by payment of a nonrefundable special service fee of \$10.00. Applicants must at the same time request the registrars or record offices of the colleges of their baccalaureate degrees to send official transcripts of their records directly to the Office of Admissions and Records. If other institutions have been attended in the course of undergraduate or prior graduate study, transcripts should be requested from them as well. Applications and transcripts should be received at least one month in advance of registration.

Any student with a bachelor's degree who wishes to enroll in a 200-, 300-, or 400-level course, who has not been formally admitted to a second bachelor's degree program, must first be admitted to the Graduate School.

If an applicant meets the minimum admission requirements of the Graduate School, a copy of the application is forwarded to the faculty of the program of interest. An applicant must be approved for a graduate program in order to be admitted to Graduate School. The Office of Admissions and Records will notify the applicant of the actions taken. Completed admissions may be one of four categories: 1. *Regular Graduate Student* — one who is approved for a degree program; 2. *Regular With Deficiencies* — one who is approved but has certain deficient courses to make up; 3. *Special Graduate Student* — one who would qualify for Regular status but is not pursuing a degree program; or 4. *Special-Provisional* — one who because of undergraduate record or late application cannot be immediately approved for a degree program.

The four categories are explained in more detail below as they pertain to a student who is first entering graduate study.

Admission Based on Undergraduate Performance

1. *Regular Graduate Student*
 - a. Minimum undergraduate grade-point average of 2.5 (A = 4.0).
 - b. Acceptance to a graduate degree program according to the criteria established for that program.
 - c. Records and adviser in program.

- d. Entrance to the program directly without having to make up course deficiencies.
- 2. *Regular with Deficiencies*
 - a. Same conditions as 1a, b, c.
 - b. Deficiencies to be made up because of lack of some of the requirements for chosen program.
- 3. *Special*
 - a. Minimum undergraduate grade-point average of 2.5.
 - b. Degree program not requested.
- 4. *Special-Provisional*
 - a. Application for admission less than six weeks before registration, irrespective of undergraduate grade-point average.
 - b. Graduation from an accredited institution, but with an undergraduate grade-point average less than 2.5.

Reclassification of Status

A student, particularly one with a *Special* or *Special-Provisional* status, may later seek reclassification. Reclassification can be gained as follows:

1. From *Special-Provisional*

The *Special Provisional* category is a transitional category which permits the Graduate School to admit an applicant while admission materials are still being gathered and processed. It is anticipated that a student in the *Special-Provisional* category will have sought reclassification by the time 9 to 12 semester hours of coursework have been completed.

a. To *Special* category.

This reclassification is possible if all entrance procedures have been completed and all other conditions of *Special* status have been met.

b. To *Regular* (degree program) category.

This reclassification is possible if the conditions for admission as a *Regular* student (either category) are met and/or a cumulative grade-point average of at least 2.75 has been maintained in graduate coursework taken at WVU.

2. From *Special* to *Regular*

Students who had not originally intended to seek a graduate degree often change their minds after experiencing the stimulation of graduate coursework. Reclassification is possible if the minimum graduate grade-point average of 2.75 has been maintained and the other conditions of the appropriate graduate program are met.

Reclassification to *Special* status can be initiated by the student by going to the Graduate School Office. Reclassification to *Regular* status, however, is possible only with the approval and petition of the graduate faculty of program of interest.

Admission Based on Prior Graduate Study

The same four categories apply as well to those who have undertaken previous graduate study. In general, the cumulative grade-point average regulations apply to any transfer student who has not completed a graduate degree. However, an applicant having received a master's degree from an accredited college or university may be admitted to whatever category is deemed most appropriate by the faculty of the program of interest.

General Regulations

Nothing in the foregoing prevents any program from establishing additional higher admission, good standing, or graduation requirements but a graduate grade-point average of at least 2.75 will be required for graduation from WVU with a graduate degree.

All graduate students are further classified as full-time or part-time students. A full-time student is one who is registered for 9 to 15 semester hours of work during a semester of the regular academic year and for 6 to 12 hours during a 9-week summer session, and for 3 to 6 hours during a 4½-week summer term. Enrollment in four 3-hour courses running the full 9 weeks will be permitted, or in two 3-hour courses in each 4½-week term. Enrollment in two 3-hour courses running for one term of 4½-weeks plus any overlapping course running for the full 9-week session will *not* be permitted. Pro-rated 9-week course credit hours plus 4½-week course credit hours must not total more than 6 hours in either term.

Graduate Record and Other Examinations

Many programs at WVU require Graduate Record Examination (GRE) scores from all applicants, but in no program is it the sole criterion for admission. Some require both the general aptitude and the appropriate advance test before considering an application for admission. Other programs require different tests, such as the Miller's Analogy. The admission requirements for each program are found in Part 4 of this *Catalog*.

Students should arrange to take the tests required for their prospective graduate majors before enrollment in the Graduate School. If GRE tests are required, the applicant should request the Educational Testing Service to forward scores to the WVU program concerned. Forms and examination dates for GRE's are a part of the GRE information packet available at the WVU Graduate School office or at other college centers throughout the nation.

Those planning to take the GRE must mail completed forms so they reach the Educational Testing Service, Princeton, NJ 08540, at least eighteen days before the date of the examination. The forms and examination dates are a part of the GRE information packet available at the WVU Graduate School office or at other college centers throughout the country. The fee for the aptitude examination is \$8.00; for an advanced examination \$9.00; and for both examinations, if taken on the same day, \$15.00.

Information about the Miller's Analogy test may be obtained from the psychology department of the applicant's undergraduate institution.

Foreign Students

All applications for admission from students in whose baccalaureate college English was not the official language of instruction must take "The Test of English As a Foreign Language" (TOEFL). Such students must submit satisfactory TOEFL scores along with their admission forms to the Office of Admissions and Records at least four months in advance of the proposed date of entry. Information on location of testing centers, dates of testing, and application forms should be obtained from TOEFL, Educational Testing Service, Princeton, NJ 08540 USA.

Petitions by Seniors for Graduate Credit

Students in WVU colleges and in colleges where WVU offers off-campus coursework who are within 12 semester hours of graduation may petition the Graduate School to be allowed to enroll for courses for which they may receive graduate credit after obtaining the baccalaureate and being admitted to the Graduate School. Such students must be eligible for admission to the Graduate School. Furthermore, the coursework may not be counted for both undergraduate and graduate credit, and the petition must have been approved before or at the time of enrollment.

The maximum amount of graduate credit permitted under this regulation is 15 hours. Combined graduate and undergraduate credit must not exceed 18 hours in one semester or 12 hours in a 9-week summer session (see last paragraph of General Regulations).

Graduate Adviser

Each academic unit through which graduate degree programs are administered has one or more graduate advisers. At the time of admission or shortly thereafter an adviser will be assigned to each entering graduate student. Adviser and student should meet prior to first enrollment and begin to formulate a plan of study.

Contractual Nature of Graduate Study

Graduate study at WVU can be compared to a series of contractual arrangements between a student and the graduate faculty of the University. Students' rights and privileges are contained in these, as well as their obligations and responsibilities. These contracts, or documents, are the *Graduate Catalog*, the plan of study, and the prospectus if research is one of the degree requirements.

Graduate Catalog

The *Graduate Catalog* which is in effect when a student begins work toward an advanced degree constitutes an agreement between the student and the Graduate School of WVU. Acceptance by the University and enrollment on the part of the student signify the willingness of each party to abide by all the conditions stated in this *Catalog*.

If there are major changes in this *Catalog* during the course of a student's studies, the student does not have to abide by them unless they are promulgated by the Board of Regents or by local, state, or federal law. However, by choice

and with the approval of adviser, committee (if appointed), and Graduate School, a student may make "a change in *Catalog* " and agree to meet *all the conditions* of a later *Catalog* than that under which the student entered.

Plan of Study

Shortly after entrance into a degree program and usually before 9 to 12 hours of graduate coursework have been completed, a meeting is held among student, adviser, and committee (if appointed) to draw up a plan of study. Depending on degree sought and field of study, the plan may also contain the outline of the research problem to be undertaken. Some graduate programs have student and committee meet at a later date to delineate the research project more formally as a *prospectus* for the report, thesis, or dissertation.

The plan of study is subject to approval by the Dean of the Graduate School and is made a part of the student's record. It then becomes a formal agreement between student and program faculty as to the conditions which must be met for completion of the degree requirements. Any subsequent changes in plan of study (or prospectus) can be made only through mutual agreement and with Graduate School approval.

When the binding nature of these documents is fully understood, there is less likelihood that later misunderstanding will arise. Thus anyone who contemplates application to the Graduate School at WVU is urged to read this *Catalog* carefully and request clarification where needed. A student must be very aware of the right to express personal views in the drafting of the plan of study and/or research prospectus. Should disagreement arise at any time, the responsibility for arbitration rests with the Dean of the Graduate School or an appeals committee appointed by the Dean.

Registration Requirement

So long as a graduate student is making use of University library and research facilities, consulting with graduate committee members, or anticipating final examination, enrollment for graduate credit is necessary. In no other manner can the University receive credit for its contribution to graduate study, attest to student status, or guarantee the protection to which students are entitled. A student may not take the final examination or complete other conditions for graduation unless duly enrolled. However, students returning to the campus just to take their final examinations or to complete some other degree requirements need not attend the general registration for that semester. Instead, they may request late registration at the Office of Admissions and Records when they return to the campus.

Candidacy

Admission to candidacy for any graduate degree is an additional requirement over and above admission to the Graduate School and admission to a graduate program in a particular department, school, or college. A candidate for a graduate degree is a student who has been officially admitted to the Graduate School and to a graduate program and has satisfactorily completed a suitable period of graduate work in residence as a regular graduate student in which ability to do work of graduate caliber is demonstrated to the satisfaction of the adviser and graduate committee. In doctoral programs and on some master's

programs it is established by successful completion of a departmental qualifying, comprehensive, or candidacy examination as further explained in the following pages under requirements for the doctor's degree, and in Part 4 of this *Catalog*.

Credit Limitations

General

Credit toward a graduate degree may be obtained only for courses listed in this *Catalog* and numbered 200-499 in which the grade earned is A, B, C, or S. No courses in which the grade earned is F, D, or U can be counted toward a graduate degree. No residence credit will be allowed for special field assignments or other work taken off the WVU campus without prior approval by the Dean of the Graduate School. No more than 40 percent of course credits counted toward meeting requirements of any graduate degree may be at the 200 level.

No more than 15 hours of graduate courses in any one semester may be carried by a student. For credit limitations in summer enrollments see the last paragraph of General Regulations.

Transfer Credit

The Graduate School requirement for the master's degree at WVU consists of earning no fewer than 30 hours of graduate credit including at least 18 hours taken at WVU. For programs which require more than 30 hours, 60 percent of the coursework is expected to be of WVU origin. Written approval from the Dean of the Graduate School must be secured before taking graduate courses offered elsewhere. To be approved, such transfer credit must meet requirements for a continuous and unified program of graduate study.

West Virginia University Off-Campus Courses

The number of off-campus courses sponsored by WVU which may be counted toward a master's degree will depend on the nature of the field of study and the availability of off-campus coursework. Therefore, the student's adviser and/or graduate committee will decide which off-campus courses may be included in the plan of study.

Employed Graduate Students

Graduate students will be required by their advisers to limit their credit loads in proportion to the outside service rendered and the time available for graduate study. In general, persons in full-time service to the University, or other employer, will be advised to enroll for no more than 6 hours of work in any one semester and those in half-time service for no more than 12 hours. Maximum credit loads may be less for employed graduate students in some academic colleges and departments.

Maximum Time for Completion

Completion of requirements for any graduate degree must be accomplished within a period of seven years. For a master's degree the period starts at the

initial enrollment for graduate credit. The same is true for a doctoral degree, although when there is an intervening award of a master's degree the seven-year period for completion of the doctorate starts at the initial enrollment for a graduate course after the master's degree is conferred. Credits lost at the beginning of a graduate program under this regulation will not usually be considered for revalidation and then only upon formal petition to the Dean of the Graduate School by the student's graduate adviser or committee chairperson showing a completion program which the student must meet.

Admission to Medical Center Programs

Because of the large number of applicants and limited openings available, preference in admissions is given to qualified West Virginians although outstanding nonresident applicants will be considered. Careful consideration is given to those personal qualifications which bear upon fitness of applicants for the study and practice of the profession.

How to Apply

Applicants for admission to any of the schools of the WVU Medical Center should write to the Assistant to the Dean of Admissions and Records, Medical Center, West Virginia University, Morgantown, WV 26506, who will furnish official blanks upon which formal application must be made.

When requesting an application by letter for any of the Medical Center programs, the permanent home address must be given.

A \$10.00 application fee is required and must accompany the applications of all but Dental Hygiene students, who pay no application fee.

Any applicant who is refused admission, or who fails to enroll after acceptance, must re-apply in the regular manner if consideration for a subsequent year is desired.

Those applicants accepted for admission to any of the programs of the WVU Medical Center, except the Division of Dental Hygiene and out-of-state applicants to the School of Dentistry, are required to deposit \$50.00 before acceptance becomes official. Applicants accepted to the Division of Dental Hygiene deposit \$40.00, and out-of-state applicants accepted to the School of Dentistry deposit \$100. If the applicant enrolls in the program of his choice, the deposit is applied to first semester tuition.

If an application for admission to the School of Medicine is withdrawn after the candidate has been offered a place and has submitted a deposit, such deposit may be refunded any time before March 30 of the year in which enrollment is anticipated, but will not be refunded after this date. Deposits submitted to all other programs are nonrefundable.

(Complete admission information for the School of Dentistry is in Part 6 of this *Catalog*; and School of Medicine, Part 8. Admission information concerning Medical Center undergraduate programs is in the *WVU Undergraduate Catalog*.)

Grading

Because of their familiarity to most students, letter grades are assigned in many graduate courses. However, better than "average" performance is expected of graduate students. They usually carry lighter course loads than they did

as undergraduates. Thus they are expected to spend more time on each course and achieve better than average mastery of the material. A few grades of C can be tolerated in graduate programs provided there are higher grades in other courses to compensate for them. However, a grade of C is considered average performance for an undergraduate student and not for one who is studying for an advanced degree.

- A — excellent (given only to students of superior ability and attainment)
- B — good (given only to students who are well above average, but not in the highest group)
- C — fair (average for undergraduate students)
- D — poor but passing (cannot be counted for graduate degree credit)
- F — failure
- I — incomplete
- W — withdrawal before the end of the fifth week of a semester or withdrawal doing satisfactory work thereafter
- WU — withdrawal doing unsatisfactory work (after the fifth week of a semester)
- X — auditor, no grade and no credit
- CR — credit but no grade

Certain Approved Graduate Courses

- S — Satisfactory
- U — Unsatisfactory (equivalent to F)

Absences

The student who is absent from class for any reason is responsible for work missed.

Students should understand that absences may jeopardize their grades or continuance in the course.

Instructors who use absence records in the determination of grades must announce this fact to students (in writing) within the first five class meetings.

It is the responsibility of the instructor to keep an accurate record of all students enrolled in his classes.

Instructors may report excessive absences to the student's dean or adviser.

Students who have been absent because of illness, authorized University activities, or other reasons, have the opportunity to make up regularly scheduled examinations.

Scholarship

The system for recording grades at WVU insures that the Dean of the Graduate School will automatically be notified whenever any student's cumulative graduate grade-point average falls below 2.75. The student's adviser will receive similar notification. No one can receive an advanced degree from WVU with a cumulative graduate grade-point average less than 2.75.

Probation. A *Regular* (degree program) graduate student whose grade-point average falls below 2.75 after the first 9 hours of graduate study will be placed on probation. A *Special* graduate student will be placed on probation if a 2.25 average is not maintained after a similar period of enrollment. A student on probation must achieve the average necessary for good standing during the next semester of enrollment. If this average is not attained, the student will not be allowed to continue in the Graduate School.

Suspension. In addition to failing to lift the conditions of probation, a student will be suspended for failing one-half or more of the coursework taken during any semester or summer session.

The above are minimum standards for the entire Graduate School; a graduate program may set even higher standards which the student must also meet. A student who has not been properly admitted or who has been suspended from a program may not further enroll. If registration for coursework is attempted, the enrollment can be withdrawn.

Credit hours for courses in which the grade is lower than C will not count toward satisfying graduate degree requirements.

In view of public and professional responsibilities, the faculty of each of the professional schools of WVU has the authority to recommend to the President of the University the removal of any student from its rolls whenever, by formal decision reduced to writing, the faculty finds that the student is unfit to meet the qualifications and responsibilities of the profession.

Theses and Dissertations

Theses and dissertations shall be presented to the student's graduate adviser or committee chairperson at least one month for master's candidates and two months for doctoral candidates before the end of the semester or summer session in which completion of all requirements is expected. The form prescribed under the Graduate School "Regulations Governing the Preparation of Dissertations and Theses" must be followed with the guidance of the student's graduate adviser or chairperson of the student's graduation committee. In order for the manuscript to be approved there shall be no more than one unfavorable vote among members of the student's committee. Two accepted copies in approved typewritten form (master's theses in bound form and doctoral dissertations unbound) shall be delivered to the Graduate School office at least one week before the close of the period in which the degree is expected to be completed (one week before the end of the summer session, one week before the end of the final examination period at the end of the first semester, or one week before Commencement Day at the end of the second semester). Additional regulations are described under specific degree requirements in the following pages, and in the "Information and Check List for Master's Candidates" and a corresponding leaflet for doctoral candidates, available at the Graduate School office. Problem reports are deposited with the major department in the form required.

The WVU Office of Publications provides service to graduate students in the preparation of multiple copies of master's theses and doctoral dissertations. Following are some of the guidelines concerning the services offered:

1. Students must furnish a neatly typewritten manuscript of the text with all pages numbered and collated in conformity with the regulations of the Graduate School. The use of carbon ribbons on typewriters will produce neater copies of the thesis.

2. The Office of Publications usually cannot reproduce oversize scores, maps, charts, or other illustrations larger than page size but it will give advice to students concerning the presentation of these materials and furnish names of businesses that can handle the work.

3. The typed pages must be delivered to Room 113, Communications Building, Patteson Drive; or to the Medical Center Copy Center; or to the Mountainlair Book Store Copy Center.

4. Charges will be the published rates which may be obtained at the copy centers.

5. Normal lead time for completion of the work is three weeks and work cannot be accepted requiring earlier delivery. Students who desire faster service will be referred to shops that may be able to provide it.

6. Delivery cannot be made except upon payment in full by cash.

7. The phone numbers to use in making special inquiry concerning this service are 293-6366 (Communications Building), 293-6645 (Medical Center Basic Sciences Building), or 293-6665 (Mountainlair Book Store).

This service should be welcomed by graduate students as it increases the possibilities open to them in meeting degree requirements. Spacing of requests over the full semester or summer will be necessary to insure continuance of the service.

Final Examinations

The final examinations shall not be given until the semester or summer session in which all other requirements for the degree are to be met. In programs requiring a thesis, or dissertation, the final examination must follow committee approval of the manuscript. The student's adviser or committee chairperson must notify the Graduate School office in advance of the time, place, and recommended examining committee membership and receive clearance in the form of the student's "shuttle sheet" before the examination can be given. Such notifications of doctoral examinations must be received in the Graduate School office at least three weeks before the examination date. All doctoral final oral examinations are open examinations and the lead time is required for public notice to the University community. Examining committees shall be comprised of no fewer than three members for the master's degree and no fewer than five members for the doctor's degree. The chairperson and the majority of master's degree committee membership must be members (full) or associate members of the Graduate Faculty. It is customary to have one member from a department other than that of the student's major field.

For doctoral programs both the dissertation and final examination chairpersons must be members (full) of the Graduate Faculty as well as the majority of the committee members. Every doctoral committee must include at least one member of a department other than that of the major field of the doctoral program. The student cannot be considered as having satisfactorily passed the final examination if there is more than one unfavorable vote among members of the examining committee. Results of each examination must be reported to the Graduate School office by return of the shuttle sheet within 24 hours of scheduled time regardless of whether or not the examination is held. Re-examination may not be scheduled without approval of the Dean of the Graduate School. No examination is to be given without the required number of committee members present. Additional requirements for research doctorates include acceptance by the Graduate School office of the dissertation bearing original

signatures of at least all but one of the committee members. As with the final examination, no more than one committee member may dissent in approval of the dissertation for the degree to be recommended.

Request for Degree

At the time of registration for the semester or the summer session in which all degree requirements are expected to be met, or at the latest within two weeks after such registration, each candidate shall submit a formal request on a special "Application for Graduation and Diploma" form to the Dean of the Graduate School for the conferring of the degree. The candidate must complete all requirements at least one week before the end of that semester or summer session. If the degree is not actually earned during that semester, the student must submit a new "Application for Graduation and Diploma" at the beginning of the term in which completion is again anticipated.

Attendance at the spring Commencement is voluntary. Anyone not planning to attend should leave a complete mailing address with the Graduate School office so that the diploma can be mailed.

Degree Programs Offered by WVU

College of Agriculture and Forestry

Major or Degree Program	Bachelor	Master	Doctorate
Agricultural Economics		M.S.	
Agricultural Education	B.S.Agr.	M.S.	
Agricultural Biochemistry		M.S.	Ph.D.
Agricultural Microbiology			Ph.D.
Agriculture		M.Agr.	
Agronomy		M.S.	Ph.D.
Animal Nutrition			Ph.D.
Animal Science		M.S.	
Animal and Veterinary Science	B.S., B.S.Agr.		
Forest Resources Management	B.S.F.		
Forestry		M.S.F.	Ph.D.
Genetics		M.S.	Ph.D.
Horticulture		M.S.	
Landscape Architecture	B.S.L.A.		
Plant Pathology		M.S.	Ph.D.
Plant and Soil Sciences	B.S.Agr.		
Recreation	B.S.R.	M.S.	
Reproductive Physiology		M.S.	Ph.D.
Resource Management	B.S., B.S.Agr.		
Wildlife Management		M.S.	
Wildlife Resources	B.S.		
Wood Industries	B.S.F.		

College of Arts and Sciences

Major or Degree Program	Bachelor	Master	Doctorate
Biology.....	B.A.....	M.A., M.S.....	Ph.D.
Chemistry.....	B.A., B.S.....	M.A., M.S.....	Ph.D.
Computer Science.....	B.S.....	M.S.....	
Economics.....	B.A.....		
English.....	B.A.....	M.A.....	Ph.D.
French.....	B.A.....	M.A.....	
Geography.....	B.A.....		
Geology.....	B.A., B.S.....	M.A., M.S.....	Ph.D.
German.....	B.A.....	M.A.....	
History.....	B.A.....	M.A.....	Ph.D.
Interdepartmental Studies.....	B.A.....		
Latin.....	B.A.....		
Library Science.....	B.A.....		
Mathematics.....	B.A.....	M.A., M.S.....	
Philosophy.....	B.A.....		
Physics.....	B.A., B.S.....	M.S.....	Ph.D.
Political Science.....	B.A.....	M.A.....	Ph.D.
Public Administration.....		M.P.A.....	
Psychology.....	B.A.....	M.A.....	Ph.D.
Russian.....	B.A.....		
Sociology.....	B.A.....	M.A.....	
Spanish.....	B.A.....	M.A.....	
Speech Communication.....	B.A.....	M.A.....	
Statistics.....	B.S.....	M.S.....	

College of Business and Economics

Business Management.....	B.S.B.Ad.....	M.B.A.....	
Industrial Relations.....		M.S.....	
Economics.....	B.S.....	M.A.....	Ph.D.
Accounting.....	B.S.B.Ad.....		
Finance.....	B.S.B.Ad.....		
Marketing.....	B.S.B.Ad.....		

Creative Arts Center

Art.....	B.A.....	M.A.....	
Visual Art.....	B.F.A.....	M.F.A.....	
Drama.....	B.F.A.....	M.A.....	
Music.....	B.M.....	M.M.....	D.M.A. Ph.D. Ed.D.

School of Dentistry

Dental Hygiene.....	B.S.....		
Dentistry.....			D.D.S.
Orthodontics.....		M.S.....	

College of Engineering

Major or Degree Program	Bachelor	Master	Doctorate
Aerospace Engineering.....	B.S.A.E.....	M.S.A.E.....	
Agricultural Engineering.....	B.S.Ag.E.....	M.S.Ag.E.....	
Chemical Engineering.....	B.S.Ch.E.....	M.S.Ch.E.....	
Civil Engineering.....	B.S.C.E.....	M.S.C.E.....	
Electrical Engineering.....	B.S.E.E.....	M.S.E.E.....	
Engineering.....		M.S.E.....	Ph.D.
Industrial Engineering.....	B.S.I.E.....	M.S.I.E.....	
Mechanical Engineering.....	B.S.M.E.....	M.S.M.E.....	
Theoretical and Applied Mechanics.....		M.S.T.A.M.....	

College of Human Resources and Education

Counseling and Guidance.....		M.A.....	C.A.S.
Education.....			Ed.D.
Education Administration.....		M.A.....	C.A.S.
Educational Psychology.....		M.A.....	
Elementary Education.....	B.S.....	M.A.....	C.A.S.
Family Resources.....	B.S.....	M.S.....	
Reading.....		M.A.....	C.A.S.
Rehabilitation Counseling.....		M.S.....	
Secondary Education.....	B.S.....	M.A.....	C.A.S.
Special Education.....		M.A.....	C.A.S.
Speech Pathology and Audiology.....	B.S.....	M.S.....	

School of Journalism

Journalism.....	B.S.J.....	M.S.J.....	
Journalism Education.....	B.S.J.Ed.....		

College of Law

Law.....			J.D.
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School of Medicine

Anatomy.....		M.S.....	Ph.D.
Biochemistry (Medical).....		M.S.....	Ph.D.
Medical Technology.....	B.S.....	M.S.....	
Medicine.....			M.D.
Microbiology.....		M.S.....	Ph.D.
Pharmacology.....		M.S.....	Ph.D.
Physical Therapy.....	B.S.....		
Physiology and Biophysics.....		M.S.....	Ph.D.

College of Mineral and Energy Resources

Engineering of Mines.....	B.S.E.M.....	M.S.E.M.....	
Petroleum Engineering.....	B.S.Pet.E.....	M.S.Pet.E.....	

School of Nursing

Major or Degree Program	Bachelor	Master	Doctorate
Nursing	B.S.		

School of Pharmacy

Pharmaceutical Sciences.....	M.S.
Pharmacy	B.S.

School of Physical Education

Education in cooperation with Human Resources and Education.....	Ed.D.
Physical Education	B.S.P.E. M.S. C.A.S.
Physical Education Interdisciplinary	B.S.P.E.
Safety Education.....	M.S. C.A.S.

School of Social Work

Social Work	B.S. M.S.W.
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Master of Arts and Master of Science

Requirements

General: Regulations governing admission, registration, scholarship, etc., described in the preceding sections must be followed. These are also summarized in the "Information and Check List for Masters Candidates" available at the Graduate School office.

Program: No less than 30 hours of graduate work planned with the student's graduate adviser must be satisfactorily completed within a period of seven years immediately preceding the conferring of the degree. The program must be formulated in writing at the earliest possible date so as to result in a cohesive, unified, and continuous plan of study. Most plans of study consist of certain amounts of work in major and minor fields. These are described in the departmental programs in Part 4 of this *Catalog*. In degree programs requiring a theses or problem report, appropriate courses may be taken to cover the research and writing, but no more than 6 hours of credit earned for research or thesis may be counted in meeting course requirements for the degree.

Special: Each student, through consultation with a graduate adviser, must meet the special requirements of the faculty of the field of major study, subject to approval of the Dean of the Graduate School.

Doctor of Philosophy

General Requirements

Regulations governing admission, registration, scholarship, etc., described in the preceding sections must be followed. Students applying for admission to a doctoral program after having received a master's degree at WVU must file a new completed form for admission to the Graduate School with the Office of

Admissions and Records. This is to insure intent and proper records and does not entail an additional application fee.

Candidacy Requirements

Admission to the Graduate School and enrollment in graduate courses does not of itself imply acceptance of the student as a candidate for a Ph.D. degree. This is only accomplished by (1) satisfactorily passing a comprehensive preliminary or qualifying examination (either oral, or written, or both) and (2) by meeting specified language and/or other requirements.

(1) *Qualifying Examination.* After a period of residence a student will be given a comprehensive examination in order to demonstrate whether a grasp has been attained of the important phases and problems of the field of major study, their relation to other fields of human knowledge and accomplishments, and the ability to employ rationally the instruments of research in the major field. The scheduling and results of each such examination must be reported to the Graduate School office.

(2) *Foreign Language Examinations.* Competence in one or more foreign languages is a common requirement in graduate degree programs. The Graduate School does not set the foreign language requirement, but instead looks to the faculty in the graduate degree program to specify the language or languages and the level of competence to be demonstrated.

Language examinations are arranged by Assistant Professor Eleanor Gibbard, the Graduate School's foreign language examiner. She can be contacted in the Department of Foreign Languages. Examinations are administered under her direction and are scheduled several times throughout the year; in general, twice each semester and once during the summer.

When only reading competence is required, the foreign language examiner may waive an examination under either of the following conditions:

- (a) Completion of 12 semester hours or equivalent of coursework in an approved foreign language with a grade of B or better in the last three hours, at WVU or at any other institution of recognized standing, will be accepted as satisfying the reading requirement of a language, provided that it was completed no more than seven years before promotion to candidacy for the Ph.D.
- (b) Completion of French 306 at WVU with a grade of B or better within seven years of promotion to candidacy for the Ph.D. will be accepted as satisfying the reading requirement in French.

Candidacy for the Ph.D. is granted when a student is certified as having satisfied the language requirement and/or has successfully completed the qualifying examination.

Program

The program of Ph.D. study is planned with the student's graduate adviser and committee to combine any or all of the following: Graduate courses of instruction, special seminars, independent study, supervised research, and supervised teaching designed to promote a broad and systematic knowledge of the major field and to prepare the student for the comprehensive qualifying and final examinations and writing of the dissertation.

Residence

The program for the Ph.D. generally requires at least three years of full-time graduate study at WVU.

Dissertation

The candidate must submit a dissertation pursued under the direction of the faculty of the University on some topic in the field of the major subject. The dissertation must present the results of the candidate's individual investigation and must embody a definite contribution to knowledge. While conducting research or writing a dissertation the student must register at the beginning of each semester or summer session during which credit is being earned. No residence credit will be allowed for special field assignments or other work taken off the University campus without prior approval by the Dean of the Graduate School.

Special Requirements

A student must satisfy such special requirements, subject to the approval of the Dean of the Graduate School, as may be required by the faculty responsible for the student's major field. All of the requirements for the degree shall be completed within a period of seven years.

Final Examination

If the candidate's dissertation has been tentatively approved and all other requirements have been met, upon proof of current registration and approval of the Dean of the Graduate School, the final oral examination on the dissertation can be scheduled. At the option of the faculty responsible for the degree program, a comprehensive final written examination also may be required. Results of the examination must be reported to the Graduate School office within twenty-four hours. These results, as well as acceptance of the dissertation, and certification of its suitability for immediate publication, must be reported by the committee chairperson to the Graduate School office not later than one week before the end of the semester or summer session in which the degree is expected to be granted (one week before the end of the summer session, one week before the end of the final examination period of the end of the first semester, or one week before Commencement Day at the end of the second semester).

Publication of Dissertations

All Ph.D. and other doctoral dissertations and their abstracts will be micro-filmed through University Microfilms, Ann Arbor, MI. This requirement will not be satisfied by any other publication but does not preclude publication elsewhere which is both permitted and encouraged.

Candidates are to follow "Regulations Governing the Preparation of Dissertations and Theses" regarding format and organization of the dissertation and "A Review of Copyright Matters Related to Graduate Theses and Dissertations" for information pertaining to copyrights. Both of these are on file at the Graduate School office, department offices, offices of all graduate advisers, and the University libraries. The candidate is required to maintain close contact with the supervisor or chairperson of the graduate committee on these matters in devel-

oping a dissertation so as to incorporate the special requirements of the subject discipline.

One week before the close of the semester or summer session in which the degree is expected to be conferred the candidate must meet the following requirements as well as others described in the "Information and Check List for Doctoral Candidates" obtainable at the Graduate School office:

1. Submit to the Graduate School office, in form satisfactory for microfilming, the typewritten, unbound original and first carbon copy of the dissertation signed by the candidate's committee. Two excellent machine-reproduced copies may be acceptable if approved in sample in advance and final copies conform.

2. Submit to the Graduate School office one abstract as above of the dissertation consisting of no more than 600 words.

3. Submit to the Graduate School office a microfilm contract completed and signed by the candidate.

4. Pay a fee of \$30.00 at the Graduate School office to cover the cost of microfilming the dissertation and publication of the abstract in *Dissertation Abstracts*, a bi-monthly journal which receives wide distribution. This fee is payable by certified check made out to "West Virginia University." If desired, copyright service can be provided through the Graduate School office upon receipt, along with the dissertation, of a certified check for \$10.00 made payable to "University Microfilms."

5. Complete the questionnaire entitled "Survey of Earned Doctorates" obtained at the Graduate School office and return it there.

Doctor of Education

The program of study for the Ed.D. is planned with the student's graduate adviser and committee. It combines courses of instruction, seminars, supervised research, and ancillary experience intended to provide the candidate with a variety of educationally related competencies. Special requirements, such as tools of research, also may be specified by the student's committee. All the requirements for the degree are to be completed within a period of seven years.

The Ed.D. is a program based on competencies and thus given may provide a broad overview of education or it might delve very deeply into a single aspect. Thus it is possible for a student to study music education under the supervision of the graduate faculty in Human Resources and Education in cooperation with that of the Creative Arts Center. In similar manner, there is cooperation with the graduate faculty in the School of Physical Education to form committees for those interested in physical education or safety studies, and with the Engineering graduate faculty for studies in engineering education. College facilities and faculty expertise make it possible for students wishing to concentrate more heavily in such fields as curriculum development (elementary or secondary), counseling and guidance, education administration, health education, reading, special education, and technology education.

A more extensive description of the Ed.D. can be found in the College of Human Resources and Education section of this *Catalog*.

Doctor of Musical Arts

The degree of Doctor of Musical Arts is offered through the Creative Arts Center.

Procedural Rules for Handling Cheating Cases — Graduate Students

Students enrolled in the Graduate School are expected to adhere to the methods of rigorous scholarship and to the ethics that characterize sound scholarship. Cheating is particularly grave when committed by a graduate student, since the student's presumed purposes are to master aspects of the method and content of the student's discipline and to prepare for a professional role.

Cheating is defined as including any of the following:

1. Obtaining help from another student during examinations.
2. Knowingly giving help to another student during examinations.
3. Use of notes, books, or any other source of information during examinations, unless authorized by the examiner.
4. Obtaining without authorization an examination or any part thereof before taking the examination.
5. Submitting a report, notebook, speech, outline, theme, or other written material for credit that has been knowingly obtained or copied in whole or in part from another individual's academic composition, compilation, or other product, unless appropriately acknowledged.
6. Submitting or participating in the submission of a report or examination paper falsely represented as being the result of the original efforts of the submitting student; generally called plagiarism.
7. Altering the record of any grade in any gradebook, office, or other record.
8. Any other type of misconduct, offense, or manifestation of dishonesty or unfairness relating to a student's academic work.

At the discretion of the instructor or the chairperson of the department, some cases involving cheating violations by graduate students may be resolved satisfactorily at these levels. Other instances of alleged or suspected cheating by students enrolled in the Graduate School may be reported to the Dean of the Graduate School by the chairperson of the department.

A student who is accused of cheating has the right to defend against the accusation. If the student admits guilt in a signed statement, the Dean of the Graduate School shall prescribe or, in case of suspension or expulsion, recommend to the President of WVU the penalty he deems appropriate under the circumstances. If the student denies guilt, the student shall be entitled to a hearing before the Graduate School Appeals Committee. If the Appeals Committee finds the student guilty, it may recommend the penalty it deems appropriate under the circumstances to the Dean of the Graduate School who may accept the recommendation or recommend to the President a more severe or a less severe penalty when in his judgment it is warranted. The allowable penalties for cheating include an assigned grade of "F" on the examination or work at issue, an assigned grade of "F" in the course involved, suspension (with the right to apply for readmission after a specified interval), and expulsion.

The student may appeal to the President of the University any and all decisions of the Dean in accordance with standard operating procedures as spelled out in the President's statement on due process of January 29, 1971. Appeals in regard to decisions made by the University President may be taken to the Board of Regents.

If a student admits in writing that the student has been guilty of cheating, or is found guilty of cheating by the Graduate School Appeals Committee in a case involving what is believed to be a criminal offense — such as theft of examination or text materials, alteration of records, breaking or entering build-

ings, offices, desks, safes or filing cabinets, damage to public property and other similar misconduct — the academic penalties and discipline as herein prescribed shall be applied. In addition thereto, the dean of the college or school concerned shall, with the approval of the President, cause the facts of the case to be presented to the appropriate prosecuting attorney for the prosecuting attorney's further investigation and for such criminal or other action as may be warranted.

Part 3

FINANCIAL INFORMATION

Fees and Expenses

All West Virginia University fees are subject to change without notice.
A nonrefundable special service fee of \$10.00 must accompany applications for admission to the Graduate School.

All fees are due and payable at the Comptroller's desk in the Coliseum on the days of registration. (Medical Center students pay their fees on the days of registration at the Comptroller's Office, Basic Sciences Building.) Students must pay fees before registration is accepted and class tickets are released. Completion of arrangements with the Comptroller's Office for payment from University payroll checks, officially accepted scholarships, loan funds, grants, or contracts shall be considered sufficient for acceptance of registration. Fees paid after regular registration must be paid to the University Cashier in Mountainlair. (Medical Center students pay at the Comptroller's Office, Basic Sciences Building.)

Any student failing to complete registration on regular registration days is subject to the Late Registration Fee of \$10.00.

Students registering pay the fees shown in the fees charts, plus special fees and deposits as required.

No degree will be conferred upon any candidate before payment of all tuition, fees, and other indebtedness to any unit of the University.

Special Fees

Late-registration Fee (nonrefundable).....	\$10.00
(This fee is not charged to full-time students who complete registration during the regular registration days set forth in the University Calendar. Not charged to part-time students who complete registration by the close of office hours on the eighth day following the beginning of General Registration.)	
Graduation Fee.....	10.00
(Payable by all students at the beginning of the semester or term in which they expect to receive their degree.)	
Students' Record Fee	1.00
(One transcript of a student's record is furnished by the Dean of Admissions and Records without charge. This fee is charged for furnishing an additional transcript.)	
Professional Engineering Degree (including \$10.00 Graduation Fee).....	25.00
Fee for Change in Registration (after 8th day).....	1.00
Certificate of Advanced Study in Education.....	2.00
Fee for Reinstatement of Students Dropped from the Rolls.....	3.00
Diploma Replacement Fee.....	5.00
Physical Education Student Fee.....	10.00
Student Identification Card Replacement Fee.....	1.00
Social Work Field Supervisory Fee (per semester)	70.00
Fee for Examination of Candidate for Graduate Degree.....	1.00
(For graduate students not otherwise enrolled at time of final examination.)	

Fees for Extension Courses

Courses numbered up to 199: A fee of \$12.00 per semester hour and an off-campus extension fee of \$12.00 per course are charged for enrollment in each extension course.

Courses numbered 200-499: A fee of \$14.00 per semester hour and an off-campus extension fee of \$20.00 per course are charged for enrollment in each extension course.

Fees for off-campus extension courses are due and payable at or before the first class meeting.

Laboratory Fees

Consult specific departmental sections of this *Catalog* in Part 4 concerning nonrefundable laboratory fees, deposits, and microscope rental fee.

SUMMER SESSION FEES

Tuition, per semester hour	Resident	Nonresident
Undergraduate students	\$ 9.00*	\$45.25**
Graduate and professional students (Dentistry, Law, Medicine)	14.00*	42.00**
Daily Athenaeum Fee****	1.00	1.00
Health, Counseling, and Program Services Fee***	13.50	13.50
Mountainlair Construction Fee per summer term in excess of 4½ weeks***	12.00	12.00
Mountainlair Construction Fee per 4½-week summer term or any portion thereof**	6.00	6.00
Student Educational Services Fee****	5.00	5.00
Inter-Campus Bus System Fee***	2.00	2.00

*Includes \$4.00 per semester hour Registration Fee.

**Includes \$20.00 per semester hour Registration Fee and \$8.25 per semester hour Nonresident Undergraduate Student Service Fee.

***Nonrefundable fees required of full-time students. May be paid by part-time students who desire the services. Part-time students who elect to pay these fees must pay the same amount assessed full-time students.

****Fee required of all students. (Nonrefundable unless student withdraws officially before the close of general registration.)

SEMESTER FEES IN COLLEGES AND SCHOOLS

(See Footnotes 1, 2, 3, 4)

College, School, Or Division	Full-Time ¹	
	Resident	Nonresident
GROUP I Agriculture and Forestry Arts and Sciences Business and Economics Creative Arts Center Engineering Human Resources and Education Journalism Mineral and Energy Resources Physical Education Social Work	\$109.25* plus Registration Fee of \$50.00	\$274.25* plus Registration Fee of \$250.00 and Nonresident Undergraduate Student Service Fee of \$100.00
GROUP II Dental Hygiene Law Medical Technology (Jr. and Sr. Years) Nursing Pharmacy Physical Therapy (Jr. and Sr. Years)	\$124.25* plus Registration Fee of \$50.00	\$299.25* plus Registration Fee of \$250.00 and Nonresident Undergraduate Student Service Fee of \$100.00 (Law students excluded from Nonresident Undergraduate Service Fee)
GROUP III Dentistry Medicine	\$186.25* plus Registration Fee of \$50.00	\$404.25* plus Registration Fee of \$250.00

Part-Time²

Tuition, per semester hour	Resident	Nonresident
Undergraduate students	\$ 9.00**	\$45.25***
Graduate and professional students (Dentistry, Law, Medicine)	14.00**	42.00***

*Includes Athletics Fee \$10.50; Student Educational Services Fee \$10.00; Daily Athenaeum Fee \$1.50; Health, Counseling, and Program Services Fee \$23.00; Mountainair Construction Fee \$20.00; Inter-Campus Bus System Fee \$4.25.

** Includes \$4.00 per semester hour Registration Fee.

***Includes \$20.00 per semester hour Registration Fee and \$8.25 per semester hour Nonresident Undergraduate Student Service Fee.

Mountainlair Construction Fee and Daily Athenaeum Fee

The following fees are charged all students, full-time and part-time, enrolled for regular courses of resident instruction at WVU in Morgantown:

Mountainlair Construction Fee.....	\$20.00 per semester
Daily Athenaeum Fee	\$ 1.50 per semester
Mountainlair Construction Fee.....	\$12.00 per summer term
	in excess of 4½ weeks
Daily Athenaeum Fee	\$ 1.00 per full summer session

These fees are nonrefundable unless the student withdraws officially before the close of general registration for the term or course in which he has been enrolled.

¹A full-time graduate student is one who is registered for 9 or more semester hours of work each semester of the regular academic year, 6 or more semester hours of work during a 9-week summer session, or 3 semester hours of work during a 4½-week summer term. A full-time student receives an identification card which entitles the student to admission to all athletic events. A full-time student is entitled to free medical consultation and advice from the University physician. A moderate charge is made for room calls, X-rays, special laboratory tests, drugs furnished by the University Pharmacy, minor operations, treatment of fractures and dislocations, and intravenous treatment.

A full-time undergraduate student is one who is registered for 12 or more semester hours of work each semester of the regular academic year, or 9 or more semester hours of work during the 9-week summer session. A full-time student during the regular academic year receives an identification card which entitles the student to all athletic events. A full-time student during the regular academic year or during the summer session is entitled to free medical consultation and advice from the University physician. A moderate charge is made for room calls, X-ray, special laboratory tests, drugs furnished by the University Pharmacy, minor operations treatment of fractures and dislocations, and intravenous treatment.

²A part-time graduate student is one who is registered for fewer than 9 semester hours per semester during the regular academic year, or for fewer than 6 semester hours during a 9-week summer session, or for fewer than 3 semester hours during a 4½-week summer term.

A part-time undergraduate student is one who is registered for fewer than 12 semester hours per semester during the regular academic year, or for fewer than 9 semester hours during the 9-week summer session.

³The minimum rate for noncredit courses is that charged for one semester hour of credit.

⁴Tuition, Registration Fee, Athletics Fee, Student Educational Services Fee, Health, Counseling, and Program Services Fee, and Inter-Campus Bus System Fee. Mountainlair Construction Fee and Daily Athenaeum Fee are nonrefundable after twelfth day following beginning of general registration.

ESTIMATED EXPENSES FOR MEDICAL CENTER PROGRAMS (FIRST SEMESTER)

Tuition and registration are the same for both semesters. Some expenses, such as fees, instruments, and book costs will be different for the Second Semester.

School or Division	Tuition and Registration Fees		Instruments	Lab Coats, Uniforms, e.t.c.	Books	Total	
	Resident	Nonresident				Resident	Nonresident
Dental Hygiene**							
Freshman	\$174.25	\$649.25	\$30.00	\$10.00	\$ 60.00	\$ 293.25	\$ 768.25
Sophomore	174.25	649.25	5.00	100.00	70.00	429.25	904.25
Junior	174.25	649.25	10.00	100.00	40.00	839.25	839.25
Senior	174.25	649.25	5.00	25.00	30.00	274.25	749.25
Dentistry***							
First Year	236.25	654.25	34.00	1,000.00	180.00	1,498.25	1,916.25
Summer	159.25	411.50		525.00	150.00	834.25	1,086.50
Second Year	236.25	654.25	53.00	150.00	110.00	549.25	967.25
Summer	131.50	327.50		50.00	125.00	306.50	502.50
Third Year	236.25	654.25	50.00			286.25	704.25
Summer	27.00	55.00				27.00	55.00
Fourth Year	236.25	654.25	15.00			251.25	669.25
Medical Technology**							
Junior	174.25	649.25	35.00	30.00	75.00	314.25	789.25
Summer	42.50	78.75		120.00	50.00	212.50	248.75
Senior	174.25	649.25				174.25	649.25
Medicine**							
First Year	236.25	654.25	45.00	20.00	120.00	476.25	894.25
Second Year	236.25	654.25	55.00	20.00	95.00	581.25	999.25
Third Year	236.25	654.25	55.00	10.00	85.00	331.25	749.25
Fourth Year	236.25	654.25		10.00	85.00	331.25	749.25
Nursing**							
Sophomore	174.25	649.25	5.00	90.00	95.00	364.25	839.25
Summer	67.00	284.50	5.00		28.00	317.50	317.50
Junior	174.25	649.25	5.00	60.00	60.00	239.25	714.25
Senior	174.25	649.25	5.00		65.00	244.25	719.25
Pharmacy**							
First Year	174.25	649.25	27.00	10.00	100.00	311.25	786.25
Second Year	174.25	649.25	27.00	10.00	75.00	286.25	761.25
Third Year	174.25	649.25	27.00	10.00	55.00	286.25	741.25
Physical Therapy**							
Junior	174.25	649.25	5.00	15.00	180.00	414.25	889.25
Senior	174.25	649.25	5.00	40.00	120.00	339.25	814.25
Summer	40.00	148.75	10.00	40.00		50.00	158.75

*Fees — includes lab fees, physical education fee, microscope rental, or graduation fee.

Tuition Fees (Full time)	Resident	**	Nonresident	***	Resident	Nonresident
	\$ 53.00 Tuition		\$240.00 Tuition		\$117.00 Tuition	\$335.00 Tuition
	50.00 Registration		250.00 Registration		50.00 Registration	250.00 Registration
	69.25 Special Fees *		100.00 N/R Undergrad. Student Service Fee		69.25 Special Fees *	69.25 Special Fees *
	<u>\$174.25</u>		69.25 Special Fees *		<u>\$236.25</u>	<u>\$654.25</u>
			<u>\$649.25</u>			
Part-Time and Summer Session Fees per Semester/ Hour	Resident	**	Nonresident	***	Resident	Nonresident
	\$9.00		\$45.25 (plus special fees)		\$14.00	\$42.00
Special Fees**	SEMIESTER:	\$21.50	** Under 12 hr. *** Under 9 hr.			
	SUMMER:	\$ 7.00 per five-week term \$13.00 full term: \$33.50				
				** under 9 hr. *** 9 hr. or more		
						** under 6 hr. *** 6 hr. or more

* Includes Athletics Fee, \$10.00; Student Educational Services Fee, \$1.50; Health, Counseling, and Program Services Fee, \$23.00; Mountainair Construction Fee, \$20.00; Inter-Campus Bus System Fee, \$4.25.

* * Includes Daily Athenaeum Fee, \$1.50, and Mountinlair Construction Fee, \$20.00.

Undergraduate and Graduate Music Students

Full-time or part-time students registered for bachelors' or advanced degrees in Music or the Supervisory Training Program in Music pay the regular full-time or part-time fees for all courses in music. No additional fees are assessed for Applied Music.

Students registered in other colleges or schools, including the Graduate School, may enroll in class courses in music at the regular full-time rate or part-time fee per credit hour. These students also may enroll for Applied Music for a maximum of one half-hour lesson per week; the fee for this Applied Music instruction is \$20.00 in addition to the tuition and registration fees.

Practice and Rental Fees

Practice Room — One hour a day, \$6.00 per semester; two hours, \$10.00; three hours, \$14.00; four hours, \$18.00.

Pipe-Organ Practice — One hour a day, \$10.00 per semester.

Band and Orchestra Instruments — Rental fee, \$2.50 per semester.

Auditors

Students may enroll in courses without working for grade or for credit by registering as auditors and by paying full fees. Change in status from audit to credit or from credit to audit may be made during the registration period. Attendance requirements for auditors shall be determined by the instructor of the course being audited. It is the prerogative of the instructor to strike the name of any auditor from grade report forms and to instruct the Office of Admissions and Records to withdraw the auditor from the class, if the auditor should fail to meet attendance requirements.

Remission of Fees

The tuition fee and registration fee will be remitted to a person registered in the Graduate School or the College of Law and who is employed by the University on a regular appointment, subject to the following:

(a) There will be no remission of the Daily Athenaeum Fee or the Mountain-lair Construction Fee. These fees are charged all students, full-time and part-time, who are enrolled for regular courses of resident instruction.

(b) Except as provided in "c", a graduate teaching or graduate research assistant will receive remission of tuition fee and registration fee commensurate with the hours of service required by the terms of the assistant's appointment.

(c) A faculty member on full-time appointment at any recognized institution of higher learning located in West Virginia who is taking a course of graduate study at WVU and holds an appointment as a graduate assistant will receive full remission of tuition and registration fees.

(d) A regular appointment must be effective at the beginning of a semester or summer session. Exemption from tuition fee and registration fee must be claimed at the beginning of the registration period or, in the case of a substitute appointment, within ten days after the appointment has been made.

(e) An employee who holds a regular appointment and is eligible for remission of tuition fee and registration fee in the second semester of any regular academic year also is eligible for remission of tuition fee and registration fee in

the summer session immediately following the student's term of appointment.

In certain cases an employee on regular University appointment may be permitted to register as a full-time student in the Graduate School or the College of Law. If such an employee does register as a full-time student and qualifies for remission of tuition fee and registration fee, the employee shall not be subject to the Special Services fees, except the Daily Athenaeum Fee and the Mountainlair Construction Fee, but must pay such fees to be entitled to the services provided thereby. Such employees do not receive the student identification card which provides for athletic admissions, student educational services, and health, counseling, and program services, etc.

Refunding of Fees

A student who officially withdraws from University courses may arrange for a refund of fees by submitting to the University Comptroller evidence of eligibility for a refund.

To withdraw officially, a student must apply to the Dean of Admissions and Records for permission. Semester fees will be returned in accordance with the following schedule:

First refund period ending on the twelfth day following the beginning of General Registration	} All Activity fees chargeable to Special Services and all other semester fees less \$2.50. (Under no circumstances is the amount retained less than \$2.50.)
Second refund period ending on the fifth Friday following the beginning of General Registration	} 70% of all refundable fees ⁴
Last refund period ending on the eighth Friday following the beginning of General Registration	} 40% of all refundable fees ⁴

The second Friday following the beginning of general registration for the summer session or a summer term is the end of the refund period.

No part of the Activity Fee is refundable unless the student withdraws from the University.

University policy provides that students called to the armed services of the United States may be granted full refund of refundable fees, but no credit, if the call comes before the end of the first three-fourths of the semester, and that full credit by courses be granted to persons called to the armed services of the United States if the call comes thereafter; provided, however, that credit as described above will be granted only in those courses in which the student is maintaining a passing mark at the time of departure for military service. In the recording of final grades, for three-fourths of a semester or more, both passing and failing grades are to be shown on the student's permanent record.

Service Charge on Returned Checks

A service charge of 5 percent of the amount of each check returned unpaid by the bank upon which it is drawn shall be collected unless the student can obtain an admission of error from the bank.

If the check returned by the bank was in payment of University and registration fees, the Comptroller's Office shall declare the fees unpaid and registration cancelled if the check has not been redeemed within three days from date of written notice. In such a case the student may be reinstated upon redemption of the check, payment of the 5 percent service charge, Reinstatement Fee of \$3.00, and Late Payment Fee of \$10.00

Residential Status

The West Virginia Board of Regents has adopted regulations governing the classification of students as residents or nonresidents for admission and fee purposes at all institutions under its jurisdiction.

General

Students enrolling in WVU shall be classified as resident or nonresident for admission, tuition and fee purposes by the Dean of Admissions and Records. The decision shall be based upon information furnished by the student and all other relevant information. The Dean of Admissions and Records is authorized to require such written documents, affidavits, verifications, or other evidence as are deemed necessary to establish the domicile of a student. The burden of establishing residency for tuition and fee purposes is upon the student.

If there is a question as to residence, the matter must be brought to the attention of the Dean of Admissions and Records and passed upon at least two weeks before registration and payment of tuition and fees. Any student found to have made a false or misleading statement concerning the student's residence shall be subject to disciplinary action and will be charged the nonresident fees for each session theretofore attended.

Residence Determined by Domicile

Domicile within the state means adoption of the state as a fixed permanent home and involves personal presence within the state with no intent on the part of the person to return to another state or country. West Virginia domicile may be established upon the completion of at least twelve months of continued residence within the state before the date of registration, provided that such twelve months residency is not primarily for the purpose of attendance at any institution of learning in West Virginia.

Establishment of West Virginia domicile with less than twelve months residence before the date of registration must be supported by proof of positive and unequivocal action, such as, but not limited to, the purchase of a West Virginia home, full-time employment within the state, paying West Virginia property tax, filing West Virginia income tax returns, registering to vote in West Virginia and the actual exercise of such right, registering of motor vehicles in West Virginia, and possessing a valid West Virginia driver's license. Additional items of lesser importance include transferring or establishing local church membership, involvement in local community activities, affiliation with local social, civic, fraternal, or service organizations, and various other acts which

may give evidence of intent to remain indefinitely within the state. Proof of a number of these actions shall be considered only as evidence which may be used in determining whether or not a domicile has been established.

Minors

Minors are defined by the West Virginia Code (2-2-10) as persons under 18 years of age. The residence of a minor shall follow that of the parents at all times, except in extremely rare cases where emancipation can be proved beyond question. The residence of the father, or the residence of the mother if the father is deceased, is the residence of the unmarried or unemancipated minor. If the father and the mother have separate places of residence, the minor takes the residence of the parent with whom the minor lives or to whom the minor has been assigned by court order. The parents of a minor will be considered residents of West Virginia if their domicile is within the state.

A minor student who is properly admitted to an institution as a resident student shall retain that classification as long as the student enrolls each successive semester.

Emancipated Minor

An emancipated minor may be considered as an adult in determining residence, provided satisfactory evidence is presented that neither of the parents, if living, contribute to the minor's support nor claim the minor as a dependent for federal or state income tax purposes.

In the event that the fact of emancipation is established, the emancipated minor assumes all of the responsibilities of an adult to establish residence for tuition and fee purposes. Proof must be provided that emancipation was not achieved principally for the purpose of establishing residence for attendance at an institution of higher education.

Students 18 Years of Age or Over

A student 18 years of age or over may be classified as a resident if: (1) the parents were domiciled in the state at the time the student reached majority and such student has not acquired a domicile in another state, or (2) while an adult the student has established a bona fide domicile in the state of West Virginia. Bona fide domicile in West Virginia means that the student must not be in the state primarily to attend an educational institution and the student must be in the state for purposes other than to attempt to qualify for resident status.

Any nonresident student who reaches the age of 18 years while a student at any educational institution in West Virginia does not by virtue of such fact alone attain residence in this state for admission or tuition and fee payment purposes.

A student who is properly classified as a resident at the time of attaining the age of 18 shall continue to be classified as a resident as long as the student enrolls each successive semester and does not establish a domicile, or legal residence, in another state.

Change of Residence

An adult student who has been classified as an out-of-state resident and who seeks resident status in West Virginia must assume the burden of proving

conclusively that the student has established domicile in West Virginia with the intention of making the student's permanent home in this state. The intent to remain indefinitely in West Virginia is evidenced not only by a person's statements but also by a person's actions. The Dean of Admissions and Records in making his determination shall consider such actions as, but not limited to, the purchase of a West Virginia home, full-time employment within the state, paying West Virginia property tax, filing West Virginia income tax returns, registering to vote in West Virginia and the actual exercise of such right, registering of motor vehicles in West Virginia and possessing a valid West Virginia driver's license. Additional items of lesser importance include transferring or establishing local church membership, involvement in local community activities, affiliation with local social, civic, fraternal or service organizations, and various other acts which may give evidence of intent to remain indefinitely within the state. Proof of a number of these actions shall be considered only as evidence which may be used in determining whether or not a domicile has been established. Factors militating against a change in residence classification may include such considerations as the fact that the student is not self-supporting, that the student is carried as a dependent on the parents' federal or state income tax returns or the parents' health insurance policy, and that the student customarily does not remain in the state when school is not in session.

Marriage

The residence of a married person is determined by the same rules of domicile which would apply if he or she were not married.

Military

An individual who is on active military service or an employee of the federal government may be classified as a resident for the purpose of payment of tuition and fees provided the individual established a domicile in West Virginia before entrance into federal service claimed, or established a domicile in another state. Sworn statements attesting to these conditions may be required. The wife and dependent children of such individuals also shall be classified as residents of the state of West Virginia for tuition and fee purposes. Persons assigned to full-time active military service and residing in West Virginia may be classified as in-state residents for tuition and fee purposes after twelve months of continuous location in the state.

Aliens

An alien in the United States on a resident visa, or who has filed a petition for naturalization in the naturalization court, and who has established a bona fide domicile in West Virginia may be eligible for resident classification, provided the alien is in the state for purposes other than to attempt to qualify for residency status as a student.

Appeal Process

The decisions of the Dean of Admissions and Records may be appealed to the President of WVU. The President may establish such committees and procedures as he determines necessary for the processing of appeals. The decision of the President may be appealed in writing with supporting documentation to the

West Virginia Board of Regents in accord with such procedures as may be prescribed from time to time by the Board of Regents.

Assistantships, Fellowships, and Traineeships

West Virginia University annually awards over 500 graduate assistantships supported from state appropriations, federal funds, private grants, and contracts; and about 200 fellowships and traineeships derived from federal programs such as EPDA, NIH, NSF, RSA, VA, etc., and from industrial and other nonpublic agencies.

Stipends for assistantships are generally stated in terms of 9 or 12-month appointments for half-time service, i.e. 20 hours service per week in the case of research assistantships, and the assisting with instruction of two courses or the equivalent in the case of teaching assistantships. Most fellowships and traineeships require enrollment for full-time study but no formal teaching or research duties. Tuition and registration fees are generally remitted. Departments may occasionally make appointments for more than or for less than half-time service with proportionately adjusted compensation. In the latter case, the remission of tuition and registration fees also is reduced proportionately. Assistants giving half-time service are advised to take no more than 12 credit hours in any one semester and some college and department regulations may be more strict in this regard.

Fellowships are awarded on the basis of academic merit and require no service in return. A graduate fellow is expected to spend full time in pursuit of studies, but may teach the extent required by the particular degree program.

Applications should be made by the first week in March to the dean of the college concerned or to the chairperson of the department in which the graduate work will be pursued.

Agriculture and Forestry

Graduate research assistantships at stipends of \$3,400 and \$4,000 for those holding bachelor and master degrees, respectively, are available on a 12-month basis for half-time service, permitting a maximum of 9 credit hours per semester and waiving of tuition in agricultural biochemistry, agricultural engineering, agronomy and genetics, animal and veterinary science, and plant pathology and bacteriology. Research assistantships at stipends of \$3,400 also are available in agricultural education, forestry, horticulture, and agricultural economics.

Teaching assistantships at stipends of \$2,700 on a 9-month basis requiring half-time service, permitting a maximum of 9 credit hours per semester and waiving of tuition, are available in animal and veterinary science, forestry, plant sciences, and resource management.

Arts and Sciences

Teaching assistantships are distributed among all departments in the College of Arts and Sciences which have graduate programs. Stipends are graduated, starting at \$2,394 for a person in the first year of graduate study and rising to \$3,204 for a person with a master's degree and a year's study toward a doctorate. All are for 9 months, require half-time service. Tuition and registration fees are waived.

Some departments have special assistantships, such as research assistantships, which carry greater responsibilities and correspondingly better stipends. Some fellowships also are assigned by individual departments. Information on these are available at the departmental offices.

Business and Economics

Business Administration and Economics — Teaching or research assistantship up to \$3,500 for 9 months, half-time service, tuition exempt.

Creative Arts

Teaching, research, performance, and technical assistantships at \$2,898 for 9 months, half-time service, tuition exempt.

Engineering

Teaching fellowships in aerospace, chemical, civil, electrical, industrial, mechanical engineering and mechanics, and nuclear engineering, up to \$4,500 for 9 months, half-time service, tuition exempt. Air pollution control, solid waste, water supply and environmental science, graduate traineeships from \$2,400 to \$3,600 for 12 months, plus dependency allowance, tuition exempt.

Engineering Experiment Station

Research assistantships in aerospace, chemical, civil, electrical, industrial, mechanical engineering and mechanics, mining, nuclear, petroleum, and geological engineering. Stipends \$250 to \$450 per month for 9 to 12 months, half-time service, tuition exempt.

Human Resources and Education

Research and teaching assistantships up to \$3,400 for 9 months, half-time service, tuition exempt.

Journalism

Teaching assistantships and graduate internships at \$2,151 and up for 9 months. Tuition waived for two semesters and following summer. Fifteen hours work per week.

Medical Science

Support from training, research, and other grants in anatomy, biochemistry, microbiology, pharmacology, and physiology; stipends from \$2,400 to \$2,800 for 12 months. Additional allowances for dependents.

Teaching assistantships at \$3,000 for 12 months. Competitive research fellowships at \$3,000 for available applicants should apply through the faculty of the appropriate graduate program and submit GRE scores, letters of reference, and transcripts of previous academic coursework.

Physical Education

Teaching and research assistantships up to \$2,150 for 9 months, half-time service, tuition exempt.

Regional Research Institute

A limited number of part-time research fellowships are awarded to graduate students who demonstrate a strong aptitude and interest in regionally-oriented basic research in the social sciences. Awards in variable amounts up to \$3,700 for 9 months, tuition exempt.

Social Work

Graduate traineeships for master degree candidates. Stipends up to \$3,000 for 12 months. Tuition paid by student.

West Virginia Center for Appalachian Studies and Development

Office of Research and Development — Research assistantships up to \$2,250 for 9 months and \$3,000 for 12 months, half-time service, tuition exempt.

Water Research Institute — Research assistantships up to \$2,700 for 9 months and \$3,600 for 12 months, half-time service, tuition exempt.

WVU Foundation Doctoral Fellowships

The West Virginia University Foundation, Inc. sponsors a series of three-year fellowships for outstanding students entering WVU doctoral programs. Yearly stipends are \$4,000 for full-time, full-year enrollment or pro-rated at \$333 per month during the 9 months of the regular academic year. These fellowships are competitive and selection is based on previous academic performance, letters of reference, GRE or other standardized achievement examination, and the applicant's statement of professional goals. Candidates must be nominated by the faculty of the proposed doctoral program no later than February 15, 1976.

Kent Fellowships

For men and women under thirty with some graduate work preparing for teaching or administration in American colleges and universities. Applications obtainable direct from Danforth Foundation, 222 South Central Avenue, St. Louis, MO 63105, for submission by November 17. Stipend up to \$2,800, with dependency and other allowances and renewal possible for a total of three years.

NSF Graduate Fellowships

Available for U.S. citizens or nationals in the fields of mathematical, physical, medical, biological, engineering, and social sciences, and in the history and philosophy of science. Stipend is \$3,600 for a 12-month tenure in up to three years. The student applies directly to the Fellowship Office, National Academy

of Sciences, National Research Council, 2101 Constitution Avenue, N.W., Washington, DC 20418. The student may select his own graduate school, but it is his responsibility to obtain admission. Application deadline is about December 1.

Oak Ridge Fellowship

The opportunity to participate in the Graduate Fellowship Program of the Oak Ridge Institute of Nuclear Studies is open to qualified students in the fields of biology, chemistry, engineering, mathematics, physics, and other scientific fields. When certified by WVU and after completion of coursework, the student has the opportunity to conduct research using the facilities of the Oak Ridge National Laboratory and other Oak Ridge facilities. The basic annual stipend is \$3,000, with an allowance of \$500 for each dependent.

Public Health Service Predoctoral Fellowships

Available for U.S. citizens or those lawfully admitted to the U.S. for permanent residence having bachelor's degree or equivalent training. Graduate work must be in the basic sciences such as biology, chemistry, physiology, biochemistry, etc. as they relate to problems of health and disease. Among the social sciences, those areas such as psychology and sociology and anthropology that relate to the problems of health and disease, and some interdisciplinary fields such as biostatistics, medical economics, cultural anthropology, etc. Stipend is \$2,400 at first-year level with \$500 for each qualified dependent and certain travel expenses; up to \$2,800 for candidate in final year of doctorate program. Application by form from Chief, Career Development Review Branch, Division of Research Grants, National Institutes of Health, Bethesda, MD 20014.

Under Public Health Service grants, there are graduate traineeships available which include the fields of air pollution control engineering and other environmental engineering fields. They range from \$3,000 for first-year students to \$3,600 for post-master's students, plus \$500 per dependent, certain travel allowances, and tuition exempt. Information on these particular traineeships is available from the Department of Civil Engineering.

Additional Reference to Fellowship Opportunities

"A Selected List of Major Fellowship Opportunities and Aids to Advanced Education for United States Citizens" provides excellent short summaries concerning sources of support for graduate study and research. Obtainable from the Fellowship Office, Office of Scientific Personnel, National Research Council, 2101 Constitution Avenue, Washington, DC 20418.

Stipend Payment Dates for WVU Foundation, EPDA, and NSF Trainees and Fellows

The start of entitlement periods under these awards is usually September 1 of each year. Invoices for payments are prepared in the Graduate School office each month between the 10th and the 15th for entitlements earned during that month. Checks are normally available at the Graduate School office for the students on the first day of the next month. Students to receive stipends under these programs must arrange their finances accordingly for their needs from the beginning of the first semester to October 1.

Part 4

GRADUATE PROGRAMS AND COURSES OF STUDY

Plan for Numbering Courses

For convenience, each course of study is designated by the name of the department in which it is given and by the number of that course. The plan for numbering is as follows:

Courses 200 to 299 — Courses for advanced undergraduate students and selected graduate students. No more than 40 percent of the credits counted for meeting requirements for a graduate degree can be at the 200 level.

Courses 300 to 399 — Courses for graduate students; students in professional programs leading to the doctorate; and selected, advanced undergraduates. Undergraduates in any class carrying a 300 course number should have a 3.0 cumulative grade-point average and have written approval on special forms from their instructors and advisers and the Graduate School Dean. Seniors within 12 semester hours of graduation may, with prior approval on special senior petition forms of their advisers and Graduate School Dean, enroll in 300-level graduate courses. (In summary, 200-level courses are intended primarily to serve undergraduate students; 300-level courses are intended primarily to serve introductory graduate and master's degree course needs.)

Courses 400 to 499 — Courses for graduate students only. All doctor's degree dissertation hours shall be awarded at the 400 level — specifically under course number 497.

Graduate degree credit hour requirements must include at least 60 percent at the 400 and 300 level.

Descriptions of Courses

- I — a course given in the first semester
- II — a course given in the second semester
- I, II — a course given in each semester
- I and II — a course given throughout the year
- Yr. — a course continued through two semesters
- S — a course given in the summer session
- hr. — credit hours per course
- rec. — recitation period
- lab. — laboratory period
- Conc. — concurrent registration required
- PR: — prerequisite
- consent — consent of instructor required
- CR — credit but no grade



Forestry students in outdoor laboratory class.



Agricultural Sciences Building.

College of Agriculture and Forestry

AGRICULTURE

Master of Agriculture

Admission requirements are those established by the Graduate School for master's degree candidates. Students desiring this degree must obtain approval from the Master of Agriculture Committee in the College of Agriculture and Forestry. The student's baccalaureate degree should be in a field sufficiently related to the course of study contemplated to provide the necessary background. A student whose baccalaureate degree is in a field considered not sufficiently related to the study contemplated may be admitted on probation until specific requirements are met or the student may be admitted on the basis of evidence of satisfactory professional experience.

Requirements. The program of work emphasizes breadth of knowledge in the general field of agriculture rather than in one subject-matter area. A student must select a minimum of 20 semester credit hours from the four subject-matter groups shown in the list below. A minimum of 5 credit hours must be selected from each of the first three groups and no more than 12 semester credit hours, including 3 semester credit hours for the Problem Report, may be selected from any one of the four groups. The 3 semester credit hours obtained for the Problem Report will be counted as credit in the subject-matter group to which it pertains.

Subject Matter Groups

Group 1

Animal Nutrition
Animal Physiology and Breeding
Animal Production

Group 2

Crop Science
Soil Science
Horticulture

Group 3

Agricultural Economics
Agricultural Education

Group 4

Agricultural Bacteriology
Agricultural Biochemistry
Agricultural Mechanics
Entomology
Food Science
Genetics
Landscape Architecture
Plant Pathology
Veterinary Science

The student may choose the additional courses from within the College of Agriculture and Forestry or from offerings of other colleges and schools of WVU. An overall grade-point average of 3.0 is required for graduate courses included as part of the approved program for the degree.

It is recommended that 6 semester credit hours of Special Topics be the usual amount of such credit counted for the Master of Agriculture degree, but in cases of unusual or hardship circumstances the student's Graduate Committee may increase such credits to a maximum of 12 credit hours. Special Topics credit will be limited to a maximum of 6 credits per subject-matter group.

Study Options

The student may choose either of the following two study options:

1. *Problem Report Option.* Completion of a minimum of 30 semester credit hours of work including a problem report. The problem report will count for not more than three credit hours toward fulfillment of the 30-hour requirement.

The problem report may be based on a professional action program including development of professional materials, a plan for solving a pertinent problem, or preparing a research report based on information from original or secondary sources. The problem report must be approved in advance by the student's Graduate Committee. On completion of the required course work and problem report, an oral examination will be given by the student's Graduate Committee, and at its discretion also may give a written examination.

2. *Course-Work Option.* Completion of 36 semester credit hours of approved graduate courses. Upon completion of the coursework, each candidate must undergo both a written and an oral examination by his Graduate Committee.

Agriculture

200. *Agricultural Travel Course.* S. 6 hr. Tour and study of production methods in major livestock and crop regions of the United States and other countries. Influence of population, climate, soil, topography, markets, labor, and other factors on agricultural production.

360. *Problem Report for the Degree of Master of Agriculture.* I, II, S. 1-3 hr.

AGRICULTURAL BIOCHEMISTRY

The Interdivisional Committee of Agricultural Biochemistry in the College of Agriculture and Forestry is responsible for planning and conducting course offerings in agricultural biochemistry and the graduate degree programs in agricultural biochemistry.

In addition to the requirements for admission to the Graduate School, applicants for admission to the graduate degree programs in agricultural biochemistry must have an overall grade-point average of at least 2.5 in general, analytical, organic, and physical chemistry. Deficiencies in these courses may be removed during the first year of graduate enrollment if prior consent is obtained from the agricultural biochemistry faculty.

The agricultural biochemistry student must attain a minimum final grade-point average of 3.0 in the student's formal graduate coursework, which is approved early in the student's graduate enrollment.

Master of Science

Work for the degree of Master of Science consists chiefly of course offerings selected according to the special needs of the student from 300 and 400 courses in agricultural biochemistry, medical biochemistry, chemistry, statistics, and the biological sciences. A total of no fewer than 30 hours of graduate credit is required, of which no more than 6 may be for research. A thesis is required.

Doctor of Philosophy

Applicants for the degree of Doctor of Philosophy must pass comprehensive written and oral examinations in biochemistry and one or two minor fields. The applicant does not become a candidate for the degree until passing the comprehensive examination.

Agricultural Biochemistry

Agr. Biochem.

- 210. *Introductory Biochemistry*. I, II. 3 hr. PR: Two semesters of general chemistry and one semester of organic chemistry. The biochemistry of the proteins, carbohydrates, lipids, nucleic acids, enzymes, coenzymes, and cellular metabolism in plants and animals.
- 212. *Animal Biochemistry* II. 3 hr. PR: One semester of biochemistry. Nutritional biochemistry of domestic animals.
- 213. *Introductory Biochemistry Laboratory*. II. 2 hr. PR: Agr. Biochem. 210 or consent. A laboratory course in nutritional biochemistry.
- 310. *General Biochemistry*. I. 3 hr. PR: 8 hr. Organic chemistry. A general course in biochemistry primarily intended to meet the needs of graduate students.
- 311. *Laboratory Experiments in Biochemistry*. I. 2 hr. PR: Agr. Biochem. 310 or concurrent enrollment. Experiments to demonstrate some of the basic tools and procedures of biochemical research.
- 312. *General Biochemistry*. II. 3 hr. PR: Agr. Biochem. 310 or consent. Continuation of Agr. Biochem. 310.
- 314. *Radionuclide Biochemistry*. II. 3 hr. PR: Chem. 1, 2, 131, or consent. Radionuclide methods and isotope handling as needed by students interested in biological research.
- 318. *Amino Acid Biochemistry*. I. 2 hr. PR: Agr. Biochem. 312, or consent. Properties, reactions, biosynthesis, and intermediary metabolism of amino acids.
- 410. *Biochemistry of Carbohydrates*. I. 3 hr. PR: Agr. Biochem. 312 or consent. Chemical properties, occurrence in foods and wastes, digestion, nutritional significance, and metabolism of carbohydrates. (Offered in Fall of odd years.)
- 414. *Enzymes*. II. 3 hr. PR: Agr. Biochem. 312, or consent. General survey of the chemistry of enzymes for advanced students.
- 415. *Advanced Biochemistry Laboratory*. II. 2 hr. PR: Agr. Biochem. 312 or concurrent enrollment. Application of modern biochemical techniques to experimentation in animal and plant metabolism.
- 416. *Vitamins*. I. 2 hr. PR: Agr. Biochem. 312 or consent. Identification, nomenclature and chemical structures, biochemical systems, biogenesis, pathology, and requirements of vitamins and vitamin-like compounds. (Offered in Fall of odd years.)
- 418. *Mineral Metabolism*. I. 3 hr. PR: Agr. Biochem. 312 or consent. The inorganic chemistry and biochemistry of the minerals in the body and the physiological function of minerals are studied. Special term paper is required on the chemical metabolism studies. (Offered in Fall of even years.)
- 422. *Plant Biochemistry*. I. 3 hr. PR: Agr. Biochem. 312 or consent. Advanced treatment of composition and metabolism of plants. (Offered in Fall of odd years.)
- 450. *Seminar*. I, II. 1 hr. per sem.

491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation of advanced subjects not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
497. *Research*. I, II, S. 1-15 hr.

ANIMAL AND VETERINARY SCIENCES

The Division offers a master of science program in animal science and a doctor of philosophy program in animal nutrition. The Division participates in interdivisional master of science and doctor of philosophy programs in agricultural biochemistry and in intercollege programs in genetics and reproductive physiology.

The master of science program in animal science allows maximum flexibility in courses and research problems. Students may work with beef and dairy cattle, sheep, swine, poultry, rats, and mice. They may emphasize physiology, pathology, production, breeding, or nutrition. Research problems in farm animals form the basis for many studies, but a comparative approach is emphasized.

Admission requirements are similar to those in other biological sciences. The student should have completed basic courses in the physical and biological sciences, including genetics, nutrition, and physiology. For the program in animal nutrition, analytical chemistry and organic chemistry (one year) are required. Deficiencies may prolong the time needed to complete degree programs.

The minimum undergraduate grade-point average for admission shall be either 2.75 overall or 3.0 for the last sixty hours of undergraduate work. A composite GRE score of 1,000 or better will be considered as a basis of admission. The fact that an applicant meets one or more of the above requirements shall not guarantee admission since each professor will accept only the number of advisees which can be supervised adequately with available facilities, time, and funds.

Twenty-four approved hours of coursework and a thesis are required for all master of science degrees. The doctoral programs are governed by the Graduate School general regulations.

Animal and Veterinary Science

A&VS

491. *Special Topics*. I, II, S. 1-4 hr. (1 hr. credit in special cases only). Advanced study in particular phases of such animal science topics as animal production, nutrition, physiology, breeding and genetics, veterinary science, and food science. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; max. credit, 6 hr.).
497. *Research*. I, II, S. 1-15 hr. Research in animal nutrition, physiology, breeding and production and veterinary science.

Animal Nutrition

An. Nutr.

294. *Poultry Nutrition*. II. 3 hr. PR: An. Nutr. 101. Nutritional requirements, interrelationships, and deficiencies of all types of domesticated fowl.
301. *Principles of Nutrition and Metabolism*. I. 3 hr. PR: Agr. Biochem. 210, An. Physiol. and Br. 100 or equiv. A basic course in animal nutrition.

305. *Comparative Nutrition and Metabolism*. II. 3 hr. PR: An. Nutr. 301 or consent. A comparative study of the utilization of dietary nutrients by laboratory and domestic animals and man. (Offered in Spring of odd years.)
306. *Nutrition Laboratory Methods*. II. 3 hr. PR or Conc.: An. Nutr. 301 or consent. Chemical, physical, and biological methods used in animal nutrition research.
407. *Advanced Nutrition and Metabolism*. I. 3 hr. PR: Agr. Biochem. 311 or consent. Advanced treatment of the nutrition, metabolism, nutrient interrelationship, and metabolic regulatory mechanisms of domestic animals.
409. *Nutrition and Physiology of the Ruminant*. I. 3 hr. PR: An. Physiol. and Br. 100, An. Nutr. 101, Agr. Biochem. 210. A study of the nutritional and physiological processes peculiar to the ruminant animal. (Offered in even years.)
411. *Problems in Nutritional Physiology*. I. 3 hr. PR: An. Nutr. 305 or consent. Consideration of the interrelation of nutrition with growth, reproduction, environment, disease, and related areas. (Offered in Fall of even years.)
450. *Seminar*. I, II. 1 hr.

Animal Physiology and Breeding

An. Physiol. & Br.

204. *Animal Physiology Laboratory*. I. 2 hr. PR or Conc.: An. Physiol. 100. Laboratory study of the physiological systems of animals and the influences of environment on these systems.
225. *Physiology of Reproduction*. II. 3 hr. PR: Course in biology. Comparative physiology of reproduction in higher animals; endocrine functions involved in reproduction; genetic and environmental variations in fertility mechanisms.
226. *Breeding of Farm Animals*. I. 3 hr. PR: Course in genetics or consent. Application of principles of quantitative genetics to the improvement of farm animals.
280. *Behavioral Patterns of Domestic Animals*. II. 3 hr. (1 lab.). Examination of the bases for exhibition and control of behavioral patterns of domestic animals.
425. *Endocrinology of Reproduction*. II. 4 hr. (2 labs.). PR: An. Physiol. 225 or Biol. 268 or equiv. Discussion of and laboratory experience in classical and current concepts of hormonal and neurohormonal regulation of reproductive phenomena with emphasis on species differences and similarities. (Offered in Spring of odd years.)
426. *Advanced Animal Selection*. II. 3 hr. PR: Course in Statistics and course in Genetics or equiv. An advanced course dealing with the basic concepts of experimental and statistical approaches in the analysis of quantitative inheritance with special reference to the magnitude and nature of genotypic and non-genotypic variability. (Offered in Spring of even years.)
450. *Seminar*. I, II. 1 hr.

Animal Production

An. Prod.

240. *Advanced Poultry Production*. I. 3 hr. (1 lab.). PR: Course in animal nutrition. Special phases of broiler and egg production, disease control, labor-saving studies, and recent designs in housing and equipment for all types of poultry. (Offered in Fall of even years.)
250. *Current Literature in Animal Science*. I. 3 hr. PR: An. Nutr. 101. Evaluation of current research in animal science and its application to production and management.

422. *Advanced Milk Production*. II. 3 hr. PR: An. Nutr. 101 or consent. Advanced study of the feeding, breeding, and management of dairy cattle.

Food Science

Food Sci.

267. *Advanced Meats*. II. 3 hr. (2 labs.). PR: Food Sci. 167. Composition of meat, fabrication of meat animal carcasses, factors influencing yield, physiology, and chemistry of pertinent phenomena, and meat merchandising. (Transportation for required trips in this course will generally be supplied by the College. Students are responsible for their meals and lodging.) (Offered in Spring of even years.)

Veterinary Science

Vet. Sci.

210. *Principles of Laboratory Animal Science*. I. 3 hr. (1 lab.). PR: Consent for undergraduates. The management, genetics, physiology, nutrition, disease, and germ-free quartering of common laboratory animals.
305. *Parasitology*. II. 3 hr. PR: Course in biology. Common parasites of farm animals, their control, and their effect upon the host. (Offered in odd years.)

DIVISION OF FORESTRY

Master of Science in Forestry Program

Students seeking admission to the program leading to the degree of Master of Science in Forestry should have completed an undergraduate curriculum in forestry similar to that offered at WVU, and should have an academic record well above average. Candidates for the degree may major in forest biometry, forest ecology, forest economics, forest genetics, forest hydrology, forest meteorology, forest management, silviculture, or wood industries management. The candidate must complete 30 credits of approved study, 6 of which shall constitute a thesis. The program ordinarily requires two years of residence.

Master of Science Program

(Recreation or Wildlife Management)

The Division offers a program leading to the degree of Master of Science for students who wish to major in recreation or wildlife management. Applicants should have a bachelor's degree, with good academic performance and an appropriate background in the subject matter of the chosen field. With the exception of those majoring in recreation, candidates must complete 30 credits of approved study, 6 of which shall constitute a thesis. Students majoring in recreation have the option of earning the degree on the basis of 30 hours with a thesis or 36 hours without a thesis. The program ordinarily requires two years of residence.

Doctor of Philosophy

(Forest Resources Science)

A candidate for the Doctor of Philosophy degree in Forest Resources Science may choose as the major field of study forest science, wood science, or wildlife management. Within these major fields of study, specialization is limited only by the range of competencies in the graduate faculty.

Curriculum requirements of all candidates include a block of graduate courses in the major field which will constitute a comprehensive review of the significant knowledge in that field, and a block of graduate courses in a minor area of study which will constitute an acceptable minor in the judgment of the faculty of the department concerned. A minimum of 60 semester hours beyond the bachelor's degree and exclusive of the dissertation will be required.

The research work for the doctoral dissertation must show a high degree of scholarship and must present an original contribution to the field of forest resources science. In addition to coursework and the dissertation, the candidate is required to pass a qualifying examination and a final examination.

Forestry

For.

- 218. *Forest Water Quality*. I. 2 hr. PR: Forestry major or consent. Influences of natural forest cover, forest land uses, and harvesting practices on selected water quality parameters. Laboratory sessions demonstrate forest water pollution detection and prevention techniques.
- 219. *Forest Hydrology*. II. 3 hr. PR: Consent. Description and quantitative treatment of the hydrologic cycle in nature. Primary emphasis on role of forests and topography.
- 220. *Forest Policy and Administration*. I, II. 3 hr. PR: Upperclass forestry major or consent. Forest policy in the United States; important federal and state laws; administration of public and private forests; problems in multiple-use forestry.
- 226. *Remote Sensing of Environment*. II. 2 hr. PR: Math. 3, 4. Measurement and interpretation of natural resources and environment from photography, radar, infrared, and microwave imagery.
- 233. *Principles of Industrial Forestry*. II. 3 hr. PR: Forestry senior or consent. Analysis and case studies of problems pertinent to the integration of wood conversion technology with principles of production, marketing, and management.
- 419. *Microclimatology*. II. 3 hr. PR: Consent. A description and quantitative treatment of climate near the ground in terms of physical and physiological processes of energy and mass exchange.
- 470. *Special Topics in Forestry, Wood Science, Wildlife, or Recreation*. I, II, S. 1-6 hr.
- 474. *Seminar in Forest Hydrology and Climatology*. I, II. 1 hr. PR: Consent.
- 480. *Principles of Research*. I, II. 2 hr. The scientific method as applied in the formal, concrete, and normative sciences, with special emphasis on forestry-related research plans and reports.
- 497. *Research*. I, II, S. 1-15 hr.

Forest Management

F.M.

200. *Forest Surveying, Mensuration, Management, Interpretation, and Wildlife Field Practices*. S. 5 hr. PR: Biol. 51, C.E. 5, and F.M. 122. Application and study of forest resources practice with emphasis on field problems. Course will be taught during four consecutive six-day weeks. (\$30.00 lab fee.)
201. *Forest Resources Management Southern Trip*. S. 1 hr. PR: F.M. 200 or consent. One-week trip to the Southern Pine Region to observe forest management practices on private and public lands. (\$30.00 lab fee.)
211. *Silvicultural Systems*. I. 4 hr. PR: Forestry major or consent; F.M. 12. Principles of regeneration cuttings, intermediate cuttings, and cultural operations, with their application to forest stands.
213. *Regional Silviculture*. I. 2 hr. PR: Forestry major or consent; F.M. 12; PR or Conc.: F.M. 211. Major forest types of the United States: their composition, management, problems, and silvicultural treatment.
215. *Principles of Artificial Forestation*. II. 3 hr. PR: Forestry major or consent; F.M. 12. Seeding and planting nursery practice; phases of artificial regeneration.
216. *Forest Genetics and Tree Improvement*. II. 3 hr. PR: Forestry major or consent; Genet. 272 or equiv., or consent. Forest genetic principles and their application to forest tree improvement, including crossing methods, selection systems, and other techniques.
222. *Forest Mensuration*. II. 3 hr. PR: Forestry major or consent; F.M. 122. Measurement of growth and yield; statistical methods applied to forest measurement problems.
230. *Principles of Forestry Economics*. I, II. 3 hr. PR: Forestry major or consent; Econ. 51 and 52 or equiv. Production, distribution, and use of forest goods and services. Emphasis on analytical methods and techniques dealing with forest economic problems.
232. *Forest Finance*. II. 2 hr. PR: Forestry junior or consent. Interest, discount, and rate earned, in forest production and exploitation. Particular reference to determining value of standing timber, appraisal of forest damages, and forest taxation.
233. *Forest Management*. I. 4 hr. PR: Summer Camp; PR or Conc.: Forestry major or consent; F.M. 211. Principles of sustained yield forest management. Organization of forest area, selection of management objectives, application of silvicultural systems, and regulation of cut. Forest management plan.
234. *Integrated Forest Resources Management*. II. 3 hr. PR: Forestry major or consent; senior standing. Analysis and planning for management of forest resources. Primarily involves carrying out a major management problem assignment, with actual forest tracts as focal point.
330. *Advanced Principles of Forestry Economics*. II. 3 hr. PR: Econ. 51, 52 or equiv.; F.M. 230 or equiv. Intensive study of both micro- and macroeconomics of forestry.
411. *Environmental Relationships in Hardwood Forests*. I. 3 hr. PR: F.M. 211. Environmental factors affecting establishment, composition, and growth of hardwood forests.
412. *Silvicultural Practices for Hardwood Forest Types*. II. 3 hr. PR: F.M. 211, 213. Designing proper silvicultural systems for managing Appalachian hardwood stands; reconstructing stand histories, recognizing problems, and prescribing appropriate silvicultural treatment.
431. *Advanced Forest Regulation*. I, II. 2 hr. PR: F.M. 233 or equiv. Intensive study of area and volume regulation suitable for applied forestry in the United States.

470. *Special Topics*. I, II. 1-6 hr. per sem. PR: Consent. (For the Master of Science degree, Special Topics ordinarily may count 2 to 4 hr.; max. credit, 6 hr.).
472. *Seminar in Silviculture*. I, II. 1-6 hr. per sem.; max. credit, 4 hr. PR: Consent. Reports and discussions of recent research in fundamental and applied phases of silviculture with emphasis on hardwood forest types.
473. *Seminar in Forest Management*. 1 hr.

Wood Science

W.S.

201. *Wood Industries Field Trip*. S. 2 hr. PR: W.S. 234. A trip of two-weeks' duration to observe manufacturing methods and techniques of commercial wood industry plants. Plants visited include furniture, plywood, veneer, hard board, particle board, pulp and paper, sawmilling, and preservation. (\$30.00 lab fee.) (Offered in odd years.)
231. *Wood Finishing*. I. 3 hr. PR: Forestry major or consent; W.S. 121. Surface preparation, composition of finishing materials, equipment, techniques, defects, troubleshooting, and quality control.
232. *Theory and Practice of Wood Adhesion*. I. 3 hr. PR: Forestry major or consent; W.S. 123, 141. Detailed theoretical introduction and examination of different types of adhesives and gluing techniques used in wood industry.
234. *Statistical Quality Control*. II. 3 hr. PR: Forestry major or consent; W.S. 134. Methods used to control quality of manufactured wood products. Control charts of variables and attributes. Acceptance sampling techniques. (Offered in odd years.)
235. *Light-Frame Wood Construction*. I. 2 hr. PR: Forestry major or consent. Use of wood in light-frame construction. Basic design procedures and construction methods.
240. *Wood Moisture Relationships*. II. 3 hr. PR: Forestry major or consent; W.S. 123. Principles involved in the relation between wood and moisture, and purposes, effects, and methods of seasoning.
251. *Forest Products Protection*. I. 3 hr. PR: Forestry major or consent; W.S. 123, 134. Biological organisms responsible for deterioration of wood products, their control by preservative methods, and study of fire retarding methods.
320. *Wood Microstructure*. I. 3 hr. PR: W.S. 123; senior standing, or consent. Detailed examination of wood microstructure as it relates to processing, behavior, and identification.
473. *Seminar in Wood Utilization*. I, II. 1 hr. per sem.; max. credit, 4 hr. PR: Consent. Reports and discussions of recent research in fundamental and applied phases of wood utilization.

Wildlife Management

W.M.

213. *Wildlife Ecology*. I. 4 hr. PR: Wildlife major or consent; Biol. 1 and 2. Basic principles of ecology and their application to wildlife. Field and laboratory studies of major ecosystems important to wildlife, including management of these ecosystems for wildlife.
222. *Field Ornithology*. S. 3 hr. PR: Biol. 1 and 2 or consent. Intensive field studies in recognition through sight, song, and behavioral patterns of birds, and their ecology in the central Appalachians. (Course taught at Terra Alta Biological Station.)

224. *Forest Zoology*. II. 3 hr. PR: Biol. 2. Relationships of mammals, birds, reptiles, amphibians, and fish to the forest, with emphasis on ecology and taxonomy of these groups. Laboratory emphasizes wildlife anatomy.
231. *Wildlife Techniques*. I. 3 hr. PR: Wildlife major or consent; W.M. 213, Biol. 151. Field and laboratory techniques necessary in management and study of wildlife; collection of field data, mapping, censusing, habitat evaluation, literature and scientific writing.
234. *Principles of Wildlife Management*. II. 3 hr. PR: Wildlife major or consent; W.M. 213. Major game animals and problems and principles involved in their management.
312. *Wildlife Population Ecology*. II. 3 hr. PR: W.M. 131, Stat. 211, or equiv. Theory of population growth, population change, intraspecific and interspecific relationships involved in natural regulation of populations, and effects of exploitation on wildlife populations.
370. *Wildlife Seminar*. II. 1 hr. per sem.; (4 hr. max.). PR: Consent. Discussion of current developments in wildlife management.
434. *Ecology and Management of Upland Wildlife*. II. 4 hr. PR: Consent. Ecology and management of upland game birds and mammals, with emphasis on recent literature.
436. *Ecology and Management of Wetland Wildlife*. II. 4 hr. PR: Consent. Ecology and management of waterfowl and wetland furbearers with emphasis on recent research and management literature.

Recreation and Parks

R & P

201. *Wildland Search and Rescue Techniques*. I. 2 hr. PR: Consent. Acquaints future forest, park, and recreation area professionals with the safe methods, practices, and procedures of search and rescue of lost and/or injured persons. Some weekend field trips required.
202. *Recreation Internship*. I. 3 hr. PR: R & P 43, 44, 265; Recreation major or consent. A supervised, full-time recreation leadership responsibility for a minimum of 8 weeks. Position approval in advance. Comprehensive written analysis prepared following internship field experience.
233. *Wildland Recreation Administration*. I. 3 hr. PR: Recreation junior standing or consent. Introduction to administration and management problems associated with providing recreation in wildland areas.
235. *Administration of Urban and Regional Recreation Services*. I. 3 hr. PR: Recreation major, R & P 43, 44 and 265 or consent. Administration of recreation and parks agencies, including legal foundations and responsibilities, organizational structures, personnel, finance, and services.
251. *Recreation Leadership*. I. 3 hr. PR: Recreation major or consent. Leadership, its application to recreation, and analysis of techniques. Examination of social group work method and its application, particularly in national youth organizations.
263. *Program Planning*. II. 3 hr. PR: Recreation major or consent; R & P 1. Fundamentals for general program planning; considers needs, facilities, age groups, local customs, climatic factors, etc. Planning involved in playgrounds, indoor centers, playfields, parks, hospitals, voluntary agencies, industry, and camps.
265. *Functional Planning of Recreation and Park Facilities*. II. 3 hr. PR: Recreation major or consent. Lecture and workshop. Problems and principles governing planning for functional and effective use of recreation facilities. Emphasis on playgrounds, playfields, indoor centers, parks, camps, and swimming pools.

271. *Administration of Camping Services*. II. 3 hr. PR: Recreation major or consent; R & P 40 or equiv. Principles involved in modern camping programs, and organization and administration of camps.
272. *Professional Synthesis*. II. 3 hr. PR: Recreation major or consent; senior standing, last semester of professional education, 16 hr. professional courses in recreation and parks management. A "capstone" course which requires the student to synthesize professional training into analysis and solution of a special problem in the student's option of Recreation and Parks Management.
316. *Philosophy of Recreation*. II. 3 hr. PR: Consent. Interpretation of recreation as a basic part of the living process; importance to individual community and national welfare; social and economic significance.
324. *Outdoor Recreation in Our Modern Society*. II. 3 hr. PR: For persons in recreation, park, outdoor education and conservation, or consent. Interpretation as to what outdoor recreation is, what people do, where they go, how this affects our economic, social, and cultural life, and significant trends.
348. *Outdoor Education and School Camping*. II. 3 hr. PR: For majors in education, recreation, extension, forestry, or consent. Interpretation and programing outdoor recreation.
408. *Practicum in Recreation*. I, II. 4 hr. PR: R & P 472, PESE 396, 397. Program planning, curriculum development, and job functions in recreation.
415. *Leisure and Recreation*. I. 3 hr. PR: Consent. Study of leisure as a social phenomenon and its implications for recreation.
421. *Human Interest Areas in Recreation Planning*. I. 3 hr. PR: R & P 316 or 20 hr. in Education or equiv. Exploration of human interest areas which are sources of recreation program content; their adaptation to school and municipal recreation program planning.
462. *Community Recreation*. I. 3 hr. PR: R & P 316 or consent. Study of problems related to providing adequate recreation services for a community. Standards and quality of recreation service; methods of measuring existing services and their coordination; community organization procedures. For leaders in voluntary agencies, schools, churches, and municipal recreation organizations.
472. *Seminar in Recreation*. I, II. 4 hr. PR: R & P 316. Overview and critical analysis of literature and research in recreation.

DIVISION OF PLANT SCIENCES

The Division of Plant Sciences offers the Master of Science (M.S.) degree with majors in Bacteriology, Crop Science, Soil Science, Horticulture, Microbiology, and Plant Pathology, and the Doctor of Philosophy (Ph.D) degree with majors in Crop Science, Soil Science, Microbiology, and Plant Pathology. In addition, M.S. and Ph.D. degrees are offered cooperatively in an inter-college program with majors in Developmental Biology and Genetics, and with the Division of Animal and Veterinary Sciences with a major in Agricultural Biochemistry.

Facilities for graduate research include several farms, greenhouses, growth chambers, and modern laboratories.

The student must have a bachelor's degree from any approved college and an adequate background in the physical and biological sciences. Additional undergraduate work may be required according to the needs of the field of specialization by the student. The courses required for graduate study will vary with the major, and are developed in consultation with the student's adviser and advisory committee.

A candidate for the master's degree must pass satisfactorily 30 hours of approved work, of which 6 hours may be for a thesis. A thesis is required. Admission to candidacy for the Ph.D. degree is conditioned upon a suitable period of residence and demonstrated ability to do work of graduate caliber; this is usually established by passing a qualifying examination given by the faculty in his field of study.

The general regulations of the Graduate School apply to all programs of graduate study in the Division of Plant Sciences.

Plant Sciences

Plant Sci.

- 200. *Recognition and Diagnosis of Plant Disorders*. I. 4 hr. PR: Plant Path. 201 and Entom. 204. Creates an ability for the student to use systematic inspection to determine cause or causes of a plant disorder.
- 201. *Principles and Methods of Plant Pest Control*. II. 4 hr. PR: Plant Path. 201 and Entom. 204. Concepts of control and how they are implemented by exclusion, eradication, protection, and immunization.
- 420. *Special Topics*. I, II, S. 2-6 hr. Special study in agricultural bacteriology, crop science, entomology, horticulture, plant pathology, or soil science.
- 450. *Seminar*. I, II. 1 hr. Graduate seminar in agricultural microbiology, crop science, entomology, horticulture, plant pathology, or soil science.
- 497. *Research*. I, II, S. 1-15 hr. Graduate research in agricultural bacteriology, crop science, entomology, horticulture, plant pathology, or soil science.

Agronomy (Crop Science)

Agron.

- 250. *Turfgrass Management*. I. 3 hr. PR: Agron. 2, or consent. Establishment, maintenance, and adaptation of grasses and legumes for lawns, golf courses, parks, athletic fields, and roadsides. Associating differential plant responses with soil, climatic, and biotic factors. Field trips arranged.
- 251. *Weed Control*. I. 3 hr. PR: Plant Sci. 52, Agron. 2, or consent. Fundamental principles of weed control. Recommended control measures for and identification of common weeds. 2 lec., 1 lab. (Offered in Fall of odd years.)
- 252. *Grain and Special Crops*. I. 3 hr. PR: Plant Sci. 52, Agron. 2, or consent. Advanced study of methods in the production of grain and special crops. Varieties, improvement, tillage, harvesting, storage, and uses of crops grown for seed or special purposes. (Offered in Fall of even years.)
- 254. *Pasture and Forage Crops*. II. 4 hr. PR: Plant Sci. 52, Agron. 2, or consent. All phases of pasture and forage crop production, including identification, seeding, management, use, seed production, and storage of forage crops. 3 lec., 1 lab.

Agronomy (Soil Science)

- 210. *Soil Fertility*. I. 3 hr. PR: Agron. 2 or 10. Soil properties in relation to fertility and productivity of soils; evaluation of soil fertility; production of fertilizers and their use in increasing soil fertility and productivity.
- 212. *Soil Conservation and Management*. II. 3 hr. PR: Agron. 2 or 10. Using soil technology to solve soil management problems relating to cropping systems. Field diagnosis of soil problems stressed. (Offered in Spring of odd years.)

230. *Soil Physics*. II. 3 hr. PR: Agron. 2 or 10. Physical properties of soils, water and air relationships and their influence on soil productivity. (Offered in Spring of even years.)
301. *Geotechnic*. I. 3 hr. PR: Consent. A unified approach to various aspects of soil formation and influence of formative factors on the nature of soils and their use as engineering materials. Course serves as a common meeting ground for students in the various disciplines concerned with earth science. 3 lec. (Offered in the Fall of odd years.)
315. *Soil Genesis and Classification*. I. 3 hr. PR: Agron. 2 or 10. Origin and formation of soils. Study of soil profiles and soil forming processes in field and laboratory. Principles of classification and techniques of soil mapping. 2 lec., 1 lab. (Offered in Fall of even years.)
321. *Identification of Clay Minerals in Soil*. II. 3 hr. PR: Physical chemistry or consent. Characterization of clay minerals is an important aspect in soils, geology, civil engineering, and related fields. Study of methods used in qualitative and quantitative identification of these secondary minerals. 1 lec., 2 lab. (Offered in Spring of even years.)
410. *Advanced Soil Fertility*. II. 3 hr. PR: Agron. 210, Biol. 169 or consent. Influence of soil chemical and physical properties on availability of plant nutrients; intensive study of individual plant nutrients and interactions of nutrients in soils and crops. (Offered in Spring of odd years.)
416. *Soil Chemistry*. I. 3 hr. PR: Consent. Chemistry of soil development; chemical and mineralogical composition of soils; nature and properties of organic and inorganic soil colloids; soil acidity; cation and anion exchange phenomena; soil chemistry of macro- and micro-nutrients. (Offered in Fall of odd years.)
418. *Chemistry of Soil Organic Matter*. II. 3 hr. PR: Agron. 210 or consent. Chemical composition of soil organic matter studied in relation to its physico-chemical properties and humus formation. Methods involving extraction, fractionation, and purification of soil organic components examined. 2 lec., 1 lab. (Offered in Spring of even years.)
451. *Agronomy*. I. 2 or 3 hr. PR: Second-year graduate and consent. Principles of optical mineralogy and of the polarizing microscope as applied to the study of soil minerals and soil fabrics. (Cross-listed as Geol. 451.)

Bacteriology

Bact.

314. *Soil Microbiology*. II. 4 hr. PR: Bact. 141 and organic chemistry. Occurrence and distribution of microorganisms in soils and their interrelationships. Their role in decomposition of organic matter and other transformations of soil constituents. (Offered in Spring of odd years.)
347. *Food Microbiology*. I. 4 hr. PR: Bact. 141, organic chemistry or consent. Ecology and physiology of microorganisms important in the manufacture and deterioration of foods. Techniques for the microbiological examination of foods. (Offered in Fall of even years.)
348. *Sanitary Bacteriology*. I. 3 hr. PR: Bact. 141. Standard bacteriological methods used in routine examination of water and sewage. (Offered in Fall of odd years.)

Entomology

Entom.

204. *Principles of Entomology*. I. 4 hr. PR: Biol. 1 and 2 or equiv. Basic course dealing with the anatomy, morphology, physiology, reproduction, systematics, ecology, and control of insects.
420. *Special Topics*. I, II, S. 2-6 hr. PR: Entom. 204 or equiv., or consent. Each of the following eight courses is given every other year: Advanced Taxonomy — Exopterygota, Endopterygota Part I, Part II; Larval Taxonomy, Acarology Economic Entomology, Insect Physiology, and Insecticides in the Environment.
450. *Seminar*. I, II. 1 hr. per sem.
497. *Research*. I, II, S. 1-15 hr.

Genetics

Genet.

290. *Crop Breeding*. II. 3 hr. PR: Genet. 171 or 321. Methods and basic scientific principles involved in improvement of leading cereal and forage crops through hybridization and selection. (Offered in Spring of odd years.)
321. *Basic Concepts of Modern Genetics*. I. 3 hr. PR: 8 hr. biological science and 1 yr. chemistry. Independent inheritance, linkage. Chemical nature of genetic material. Control of phenotype by genetic material. Gene action and coding of genetic material.
325. *Human Genetics*. II. 3 hr. PR: Genet. 171 or 321 or consent. Study of genetic system responsible for development of phenotype in man. (Offered in odd years.)
335. *Population Genetics*. I. 3 hr. PR: Genet. 171 or 321, or consent. Relationship of gene and genotype frequencies in populations of diploid organisms, and effects of mutations, migration, selection, assortive mating, and inbreeding in relation to single gene pairs. Application of these concepts to multigenic inheritance of quantitative traits. (Offered in Fall of even years.)
420. *Special Topics*. I, II, S. 2-4 hr. (For the Master's Degree, Special Topics ordinarily may count 2 to 4 hr.; max. credit, 6 hr.)
424. *Cytogenetics*. II. 4 hr. PR: Genet. 171 or 321, and Biol. 215 or consent. Emphasis on macromolecules that carry information of the chromosomes, cell division, and the cytological and molecular basis of genetics. Special attention given to cytogenetics of genomes and chromosome morphology and their evolution. (Offered in Spring of odd years.)
426. *Advanced Biochemical Genetics*. II. 3 hr. PR: Genet. 171 or 321 and organic chemistry. Physiological and biophysical concepts of genetic material. Structure and arrangement of genetic units. Nucleic acids as carriers of genetic information. Gene action and amino acid coding. Biochemical evolution of genetic material. Genetic control mechanisms. Biochemistry of mutation. (Offered in Spring of even years.)
450. *Seminar*. I, II. 1 hr. per sem. Recent literature pertaining to biochemical, classical, human, molecular and cytological genetics.
490. *Genetic Mechanisms of Evolution*. II. 2 hr. PR: Genet. 171 or equiv. Genetic mechanisms which result in evolutionary change. Origin of life, origin and organization of genetic variability, differentiation of populations, isolation and speciation role of hybridization and polyploidy, and origin of man. (Offered in Spring of even years.)
497. *Research* I, II. 1-15 hr.

Horticulture

Hort.

204. *Plant Propagation*. II. 3 hr. Study of practices of plant propagation and factors involved in reproduction in plants. (Offered in Spring of odd years.)
242. *Small-Fruits*. I. 3 hr. (2 lec., 1 scheduled lab.). PR: Plant Sci. 52, Hort. 107, or consent. Taxonomic, physiological, and ecological principles involved in production and handling of small-fruits. (Offered in Fall of even years.)
243. *Physiology of Vegetables*. I. 3 hr. (2 lec., 1 scheduled lab.). PR: Plant Sci. 52. Physiological and ecological principles involved in production of vegetable crops. (Offered in Fall of odd years.)
244. *Handling and Storage of Horticultural Crops*. II. 3 hr. (2 lec., 1 scheduled lab.). PR: Plant Sci. 52, Chem. 16. Characteristics of perishable crops. Methods and materials used to maintain quality. (Offered in Spring of even years.)
245. *Greenhouse Management*. II. 3 hr. Greenhouse as a controlled plant environment. How to manipulate factors influencing plant growth and development within specialized environments of greenhouses.
301. *Post-Harvest Physiology*. II. 3 hr. (1 lec., 2 labs.). Physiology and biochemistry of harvested crops. (Offered in Spring of odd years.)

Plant Pathology

Plant Path.

201. *General Plant Pathology*. I. 4 hr. Nature and causes of plant diseases; methods of control.
301. *Diseases of Economic Plants*. I, II, S. 1-3 hr. per sem., 2 hr in Summer. PR: Plant Path. 201 or 303 or consent. Recognition, cause, and control of diseases of economic plants; Sem. I, Diseases of vegetable crops and of tree and small fruits; Sem. II, Diseases of ornamental plants and field and forage crops. S, Diseases of forest trees. Students may register for 1-3 hr. in Sem. I and II, 2 hr in Summer, until 8 hours of credit are accumulated. (Offered in 1975-76 and in alternate years.)
302. *Principles of Plant Pathology*. II. 4 hr. PR: Plant Path. 153, 201, or 303, or consent. Primarily for graduate students and seniors majoring in biology, botany or agricultural science. Nature of disease in plants with practice in laboratory methods. (Offered in Spring of even years.)
303. *Mycology*. I. 4 hr. Lectures and field and laboratory studies of parasitic and saprophytic fungi.
309. *Nematology*. II. 3 hr. Primarily for graduate students majoring in the agricultural sciences or biology. Nematode taxonomy, bionomics, and control, with particular emphasis on plant parasitic forms. (Offered in Spring of odd years.)
402. *Physiology of Plant Diseases*. I. 2 hr. PR: Agr. Biochem. 291 and Plant Path. 302, or consent. Study of host-parasite interactions, with emphasis on physiological and biochemical changes that occur in higher plant tissues in response to pathogenic organisms. (Offered in Fall of even years.)
430. *Physiology of the Fungi*. II. 4 hr. PR: Organic chemistry, mycology, and bacteriology, or consent. Physiological aspects of growth, reproduction, and parasitism of fungi, with emphasis on nutrition, environment, and other biotic factors. (Offered in Spring of even years.)
440. *Taxonomy of the Fungi*. S. 3 hr. PR: Plant Path. 303. Collection and identification of fungi with emphasis upon those of economic importance. (Offered in odd years.)

DIVISION OF RESOURCE MANAGEMENT

The Division is composed of four committees: Agricultural Economics, Agricultural Education, Agricultural Engineering, and Landscape Architecture. The graduate program for Agricultural Engineering is listed under the College of Engineering, and currently there are no graduate degree programs in Agricultural Mechanics or Landscape Architecture. Graduate courses in Agricultural Mechanics and Landscape Architecture are offered to serve the needs of students who are seeking their master of science degree in other fields or those who are candidates for the Master of Agriculture degree. The Division Admissions Committee reviews and evaluates all applicants for graduate work in the Division.

Agricultural Economics

The faculty in agricultural economics offers major work for the degree of Master of Science in Agricultural Economics. Economics and agricultural economics faculties cooperate in offering a Ph.D. degree in economics. (See the College of Business and Economics section for details.)

Master of Science

Students are urged to seek approval from the Admissions Committee for one of the options listed below at the time they begin work. In all cases, approval must be obtained before completion of 18 hours of course work. Students expecting to become professional agricultural economists or who hold research assistantships should seek approval of Option A. Those intending to pursue careers in agricultural business may seek approval of Option B.

Requirements for Admission

Students may be accepted for graduate study in agricultural economics on a regular or provisional basis. Students meeting all of the following requirements are admitted as regular students:

1. A bachelor's degree.
2. Twelve or more semester credits in economics, agricultural economics, statistics, or appropriate social science courses.
3. A grade-point average of 2.5 for all credit in economics and agricultural economics.

Students not meeting the above minimum requirements may petition for admission on a provisional basis. The Admissions Committee will set requirements for removing provisional status in each case. Failure of a student to fulfill the terms of provisional admission shall result in automatic suspension.

Persons requesting transfer of graduate credit from courses outside Agricultural Economics must obtain approval of the Admissions Committee for such transfer. The average for such courses transferred must be no less than 2.5. Such petitions must include all courses appropriate to the degree; courses with low grades will not be omitted.

Options of Study

A. *Thesis Option* — A minimum of 30 credit hours of approved work to include not more than 6 hours of credit for the thesis, and enough courses to provide proficiency in economics and agricultural economics. Courses in closely related social sciences may be included.

B. *Course-Work Option* — A minimum of 36 credit hours of approved course work to provide proficiency in economics and agricultural economics. Courses in closely related social sciences may be included.

Standards of Achievement

A minimum grade-point average of 3.0 is required for all graduate credit courses taken as part of the approved program for the degree. This includes graduate credit transferred from within the University and graduate credit accumulated while pursuing a degree in agricultural economics.

Students who have earned a grade-point average of 2.75 or more with 12 or more hours of graduate credit will be admitted to candidacy. Those who do not attain this level will be placed on probation.

Examinations

Thesis Option. Satisfactory completion of an oral examination and, at the discretion of the student's graduate committee, a written examination.

Course-Work Option. Satisfactory completion of a written and an oral examination.

Resource Management

491. *Advanced Study.* I, II, S. 1-6 hr. PR: Consent.

496. *Graduate Seminar.* I, II, S. 1 hr. PR: Consent.

497. *Research.* I, II, S. 1-15 hr.

Agricultural Economics*

Agr. Econ.

200. *Land Economics.* II. 3 hr. Classification, development, tenure, use, conservation, valuation, and taxation of rural, urban, mineral, forest, water, and recreational land resources. Private and public rights in land and the effect of population on the demand for land.

206. *Farm Planning.* I. 3 hr. PR: Senior standing. Planning use of labor, soil, crops, livestock, buildings and equipment; principal factors influencing returns on farms. Farm visits required.

211. *Rural Economic Development.* I or II. 3 hr. PR: Econ. 51 or equiv. Resource utilization, economic behavior and economic systems and subsystems, trade, public revenue and its allocation, distribution of income, manpower problems, development policies, and regionalization in rural areas.

*Econ. 51 or 54 is required as a prerequisite for all graduate courses offered in Agricultural Economics.

231. *Marketing Agricultural Products*. II. 3 hr. Market organization, policies, practices, and factors affecting the marketing of agricultural products. Tour of market agencies and facilities in Pittsburgh area required.
235. *Marketing Dairy Products*. II. 2 hr. Milk-marketing policies and practices, including milk-market orders. (Offered in Spring of odd years.)
240. *Agricultural Prices*. I. 3 hr. Analysis of price-making forces which operate in the market places for the major agricultural commodities. A tour of marketing agencies and facilities may be made.
261. *Agribusiness Finance*. II. 3 hr. Credit needs for agricultural businesses, financing farm and market-agency firms, and organization and operation of credit agencies which finance agricultural business firms. (Offered in Spring of even years.)
271. *Agricultural Policy*. II. 3 hr. Examination of economic aspects of governmental price programs, production and marketing controls, subsidies, parity, export and import policies, and other programs affecting agriculture. (Offered in Spring of odd years.)
330. *Cooperative Organization*. II. 3 hr. Organization, functions, and contributions of cooperatives in an economic system. (Offered in Spring of even years.)
342. *Advanced Agricultural Economics*. I. 3 hr. Current policies, problems, and programs affecting agricultural development and food production and distribution in developing countries and the United States with emphasis on analysis of projects. (Offered in Fall of even years.)
355. *Resource Analysis*. I. 3 hr. PR: Senior standing. Construction of models consistent with economic reality for allocating the factors of production available on farms, in forests, and in non-farm agricultural businesses to produce profit maximizing plans through use of linear and dynamic programming and electronic equipment.
431. *Advanced Agricultural Marketing*. II. 3 hr. PR: Consent. Structure of agricultural marketing; economic theory as applied to agricultural marketing with emphasis on theoretical and practical applications. (Offered in Spring of even years.)
440. *Advanced Farm Management*. I. 3 hr. (Offered in Fall of odd years.)
441. *Production Economics*. II. 3 hr. PR: Consent. Economic principles of production with special application to agriculture. (Offered in Spring of odd years.)

Agricultural Education

Candidates for the Master of Science degree in Agricultural Education may be accepted on a regular or provisional basis. To be admitted as a regular graduate student, the following requirements must be met: 1. A Bachelor's degree. 2. A grade-point average of 2.5 on all undergraduate work. Students not meeting the regular admission status may petition the admissions committee for entrance under one of the alternate categories in Part 2.

Students shall combine graduate courses in agriculture and in education by taking 16 to 20 hours in agriculture and 10 to 14 hours in education. All graduate courses offered toward a degree must be approved by the student's adviser. The student and adviser shall arrange a specific curriculum to be pursued for the degree at the beginning of the graduate program. A thesis is required as a part of the 30 hours for graduation.

Students shall complete in residence 15 hours of course work after having completed one or more years of teaching vocational agriculture. This shall apply unless the student has been granted permission by the Admissions Committee to complete graduate work without teaching experience.

Agricultural Education

Agr. Ed.

260. *Principles of Cooperative Extension*. I. 2 hr. PR: Consent. Background, philosophy, and history of cooperative extension. Activities of county cooperative extension agents and cooperative extension programs in West Virginia. (Offered in Fall of even years.)
261. *Methods and Materials in Extension Education*. II. 2 hr. PR: Consent. Organization and preparation for extension teaching and the processes of communication. (Offered in Spring of odd years.)
263. *Teaching Young, Adult Farmer, and Off-Farm Agricultural Occupations Classes*. I. 2 hr. PR: Ed. Psych. 105, 106 or consent. Participation in conducting young farmer, adult farmer, and off-farm agricultural occupations classes; organization, course of study, method in teaching, and supervision of classes, young farmers' associations, adult farmers' organizations and off-farm agricultural occupations organizations. (Also listed as C&I 263.)
362. *Program Building in Cooperative Extension*. II. 3 hr. PR: Consent. Organization in relation to program building. Leadership and group action. Overall working and educational objectives, principles, method, and goals in developing county extension programs. (Offered in Spring of even years.)
364. *Organizing and Directing Supervised Farming and Supervised Occupational Experience Programs*. S. 2 hr. PR: Agr. Ed. 160 or consent. Planning programs of supervised farming and supervised occupational experience, supervising and evaluating such programs for day students, young farmer, adult farmer, and off-farm agricultural occupations classes and groups. (Also listed as C&I 364.)
460. *Planning Programs and Courses for Vocational Agriculture Departments*. S. 2 hr. PR: Agr. Ed. 160, 188. Gathering data, studying farming and off-farm agricultural occupations problems of day students, young farmers, adult farmers, and off-farm agricultural occupations groups and formulating total programs for school communities. (Also listed as C&I 460.)
461. *Seminar*. S. 1 hr.

Agricultural Mechanics

Agr. Mech.

253. *Advanced Farm Machinery*. II. 3 hr. Systems approach to selection, use, and operation of machinery as related to agriculture, forestry, and other rural activities. Emphasis on safety and environmental impact. Use of records for management decisions, purchase, replacement, sale, or overhaul. 2 hr. rec., 3 hr. lab.
259. *Farm Structures*. II. 3 hr. Study of structures required for agriculture, family housing, storage, and recreation. Includes function, planning, layout, materials, construction techniques, prefabrication, repair, remodeling, and costs. 2 hr. rec, 3 hr. lab.
270. *Electricity in Agriculture*. II. 3 hr. Study of production and safe use of electricity for home and agriculture. Emphasis on approved wiring practices, motors, and electrical controls and their applications in lighting, heating, refrigeration, air conditioning, water supply, and processing. 2 hr. rec., 3 hr. lab.
275. *Agricultural Engines*. I. 3 hr. Study of power sources (gasoline, diesel, turbine, wankel, etc.) for agriculture, forestry, and other rural activities. Operation, selection, record keeping, maintenance techniques, emissions impact on power and fuel efficiency, power trains, transmissions, and service procedures. 2 hr. rec., 3 hr. lab.
352. *Advanced Farm Mechanics*. S. 3 hr. PR: Agr. Mech. 152. Development of advanced skills with hand and power tools. Areas of emphasis dependent upon needs of

individual students. Care and maintenance of power tools and shop organization and planning are essential parts of this course. 1 hr. rec., 6 hr. lab. (Offered Summer of every third year — next offering 1975.)

Landscape Architecture

L.A.

- 229. *Landscape Design*. I. 3 hr. An appreciation of basic principles of design and information pertaining to use and care of ornamental plants around the house.
- 248. *Design Analysis*. II. 2 hr. PR: Consent. Analysis of planning and design projects with respect to offering solutions to a given problem. (Offered in Spring of odd years.)
- 250. *Advanced Landscape Architectural Design. I*. I. 5-6 hr. PR: L.A. 151. Advanced design; continuation of L.A. 150 and 151 with more comprehensive problems and in-depth collaborative study.
- 251. *Advanced Landscape Architectural Design. II*. II. 6 hr. PR: L.A. 250. Advanced comprehensive design problems; continuing L.A. 250 theme, but generally requiring individual work.
- 265. *Regional Design*. I. 3 hr. PR: Consent. Consideration of regional landscapes in order to effectively relate design to the ecology and development of a region. (Offered in Fall of odd years.)
- 276. *Recreation Planning*. I. 3 hr PR: Consent. Design of park and recreation areas involving park history, classification theory, and administration.
- 284. *Professional Practice*. II. 3 hr. PR: Consent. Profession of landscape architecture involving procedures in preparation of contract documents, fees, estimates, operation of an office, and relationship to clients and contractors. (Offered in Spring of even years.)

College of Arts and Sciences

BIOLOGY

The Department of Biology offers work leading to the degrees of Master of Arts, Master of Science, and Doctor of Philosophy in biology. The department has certain requirements in addition to those of the Graduate School. Information concerning the graduate programs may be acquired by writing the Chairman, Department of Biology, before seeking admission. Students may enroll in graduate courses and may work toward an advanced degree only with the approval of the department.

Applicants are expected to have a broad foundation of training in biology and related sciences, particularly chemistry, mathematics, and physics. The applicant also is expected to present Graduate Record Examination scores and three letters of recommendation for evaluation. Deficiencies in undergraduate training may prolong the time for completion of required program for advanced degrees.

A summer field station, Terra Alta Biological Station located at Terra Alta, Preston County, offers two summer sessions for coursework and research. Write to Department of Biology for descriptive folder.

Two other field stations (at Lewes, Del., and Wallops Island, Va.) are available for selected graduate courses in marine biology. Research opportunities at the M.S. level also are available in marine biology. Contact Marine Science Director, Department of Biology, for information.

Biology

Biol.

- 201. *History of Biology*. I. 3 hr. PR: Biol. 1 and 2 or equiv. History of development of biological knowledge, with philosophical and social backgrounds.
- 209. *Topics and Problems in Biology*. I, II, S. 1-4 hr. PR: Consent. Topics and problems in contemporary biology. All topics or problems must be determined in consultation with instructor.
- 211. *Life Cycle of the Cell*. I. 4 hr. PR: Biol. 104. Advanced study of fundamental cellular activities and their underlying molecular processes. (Lab fee \$15.00.)
- 215. *Cytology*. II. 4 hr. PR: Biol. 1 and 2 or equiv. Cells, their structure and function. (Lab fee \$10.00.)
- 231. *Behavior of Organisms*. II. 4 hr. PR: Biol. 1 and 2, Psych. 1 or equiv. Principles of individual and group behavior. (Lab fee \$15.00.) (Also listed as Psych. 231.)
- 232. *Physiological Psychology*. I. 3 hr. PR: 9 hr. psychology, behavior, physiology, or graduate standing. Introduction to physiological mechanisms and the neural basis of behavior. (Also listed as Psych. 232.)
- 235. *Primate Behavior*. I. 3 hr. PR: Consent. Primates as they exist in their natural habitats, as they suggest clues to human behavior and the evolution of behavior. Case studies and comparative primate behavior of prosimians to monkeys, to apes, to human hunters and gatherers. (Also listed as S.A. 257.)
- 243. *Plant Ecology*. I. 4 hr. PR: Biol. 1 and 2 or equiv. Environmental and ecological relationships of plants. (Lab fee \$10.00.)

246. *Limnology*. I. 4 hr. PR: Biol. 103 or consent. Physical, chemical and biological characteristics of inland waters with an introduction to the principles of biological productivity. (Lab fee \$10.00.)
251. *Principles of Evolution*. I, S. 3 hr. PR: Biol. 1 and 2 or equiv. Introduction to the study of evolution.
252. *Flora of West Virginia*. II, S. 3 hr. PR: Biol. 1 and 2 or equiv. Consideration of the native plant life of the state.
253. *Plant Anatomy*. I. 4 hr. PR: Biol. 1 and 2 or equiv. Anatomy of seed plants. (Lab fee \$10.00.)
254. *Plant Geography*. II, S. 3 hr. PR: Biol. 1 and 2 or equiv. Study of plant groupings and worldwide distribution of plants.
255. *Invertebrate Zoology*. II. 4 hr. PR: Biol. 1 and 2 or equiv. Advanced study of animals without backbones. (Lab fee \$10.00.)
256. *Ornithology*. II. 3 hr. PR: Biol. 1 and 2 or equiv. Lecture and laboratory studies on ancestry, evolution, topography, anatomy and physiology, systematics, behavior, migration, and ectoparasites of birds. Field studies will be limited in scope.
257. *Ichthyology*. I. 3 hr. PR: Biol. 101 or consent. Internal and external structure of fishes, their systematic and ecological relationships, and their distribution in time and space. (Lab fee \$10.00.)
258. *Mammalogy*. II. 3 hr. PR: Biol. 103 or W.M. 224 and consent. Mammals and their biological properties with emphasis on life history, ecology, and distribution of regional forms.
259. *General Parasitology*. I. 4 hr. PR: Biol. 1 and 2 or equiv. Introduction to the biology of parasites. (Dissection kit required.) (Lab fee \$10.00.)
261. *Comparative Anatomy*. I. 5 hr. PR: Biol. 101 or equiv. A comparative study of the morphology of selected vertebrates emphasizing functional and evolutionary relationships. (Dissection kit required.) (Lab fee \$15.00.)
262. *Vertebrate Embryology*. II. 5 hr. PR: Biol. 1 and 2, 101 or equiv. Experimental and descriptive approach to study of development of vertebrates. (Lab fee \$15.00.)
263. *Vertebrate Microanatomy*. II. 5 hr. PR: Biol. 101 or 261 and consent. Structural and functional approach to study of tissues and organs of vertebrates. (Lab fee \$10.00.)
264. *Comparative Developmental Anatomy*. II. 3 hr. PR: Biol. 261. Anatomy and development of the organs and systems of various vertebrates.
265. *Comparative Neuroanatomy*. II. 4 hr. PR: Biol. 101 or 261 and consent. Comparative study of development and anatomy of the nervous systems of the vertebrates. (Dissection kit required.) (Lab fee \$15.00.)
266. *Human Physiology*. I, II, S. 4 hr. PR: Biol. 1 and 2 or consent. Introductory course in the function of man. (Lab fee \$10.00.)
267. *Comparative Physiology*. II. 4 hr. PR: Biol. 101 and 266, (or equiv. physiology course) or consent. Study of the diverse ways in which different kinds of animals meet their functional requirements. (Lab fee \$20.00.)
268. *Physiology of the Endocrines*. I. 3 hr. PR: Biol. 101 or 266, or equiv., organic chemistry or consent. Regulation of the organs of internal secretions, and mechanisms of action of the hormones produced.
269. *Physiology of the Endocrines — Laboratory*. I. 1 hr. PR or Conc.: Biol. 268. Experimental techniques used in study of the endocrine system. (Lab fee \$15.00.)
309. *Topics in Biology*. I, II, S. 1-4 hr. PR: Consent. Topics in contemporary biology. Topic will be selected by instructor for formal presentation.

311. *Biology Seminar*. I, II. 1 hr. Discussions and presentations of general interest to biologists.
313. *Problems in Biology*. I, II, S. 1-4 hr. per sem. PR: Consent. Problems in contemporary biology. Selection of topics to be determined in consultation with instructor.
314. *Topics in Cellular and Molecular Biology*. I, II, S. 1-4 hr. PR: Consent. Topics in contemporary cellular and molecular biology. Topic will be selected by instructor for formal presentation.
315. *Molecular Basis of Virology*. II. 3 hr. PR: Biol. 104 or consent. Lectures on bacterial, animal, and plant viruses; their structure, replication, and interaction with host cells. Discussion of the contributions virology has made to the understanding of molecular mechanisms in biology.
316. *Seminar in Cellular and Molecular Biology*. I, II. 1 hr. Selected areas of cellular and molecular biology.
322. *Topics in Bioscience Education*. I, II, S. 1-4 hr. PR: Consent. Topics in contemporary biology. Topic will be selected by instructor for formal presentation.
323. *Seminar in Bioscience Education*. I, II. 1 hr. Selected areas of bioscience education.
331. *Principles of Animal Behavior*. I. 4 hr. PR: Biol. 231 or equiv. Concepts in ethology and the principles governing interactions between animals. A comparative approach to animal behavior. (Also listed as Psych. 231.)
332. *Physiological Mechanisms of Animal Behavior*. II. 3 hr. PR: Biol. 231, 232 or equiv. Explores the way behavior is controlled in a wide variety of animals so that commonalities and varieties of neural and endocrine mechanisms may be better understood. (Also listed as Psych. 332.)
333. *Behavioral Ecology*. II. 4 hr. PR: Biol. 103 and 231 or consent. Discussion of the influences of the external environmental factors on the regulation and control of behavior.
338. *Seminar in Animal Behavior*. I, II. 1 hr. Selected areas of animal behavior.
339. *Problems in Animal Behavior*. I, II, S. 1-4 hr. PR: Consent. Problems in contemporary animal behavior. Selection of topics to be determined in consultation with instructor.
342. *Primary Production in Aquatic Environments*. II. 3 hr. PR: Biol. 246 or consent. Lecture and discussions on the methods of measuring primary production and the integration of results of modern studies into ecosystem dynamics.
343. *Plant Communities*. S. 3 hr. PR: Biol. 1 and 2 or equiv. Field studies in the plant ecology of the central Appalachians.
345. *Fisheries Science*. II. 4 hr. PR: Biol. 257 or consent. Population dynamics in relation to principles and techniques of fish management.
346. *Dynamics of Ecosystems*. II. 3 hr. PR: Biol. 103 or consent. Modern concepts in ecology covered through discussion of readings. Topics treated are selected from the areas of population genetics, energy flow, nutrient cycling, and community structure.
347. *Seminar in Ecology*. I, II. 1 hr. Selected areas of ecology are presented and discussed.
348. *Topics in Ecology*. I, II, S. 1-4 hr. PR: Consent. Problems in contemporary ecology. Topic will be selected by instructor for formal presentation.
349. *Problems in Ecology*. I, II, S. 1-4 hr. PR: Consent. Problems in contemporary ecology. Selection of problems to be determined in consultation with instructor.
350. *Biosystematics*. I. 3 hr. PR: Biol. 1 and 2 or equiv. Techniques, history, and principles of the systematics of plants and animals.

351. *Plant Morphology (Algae and Fungi)*. I. 4 hr PR: Biol. 1 and 2 or equiv. Development and structure of algae and fungi.
352. *Plant Morphology (Bryophytes and Vascular Plants)*. II. 4 hr. PR: Biol. 1 and 2 or equiv. Development and structure of bryophytes and vascular plants.
353. *Taxonomy of Vascular Plants*. S. 3 hr. PR: Biol. 1 and 2 or equiv. Field studies in the taxonomy of higher plants.
354. *Fresh-Water Algae*. I. 4 hr. PR: Biol. 1 and 2 or equiv. Taxonomy, cytology, and ecology of aquatic, aerial, and land forms of fresh-water algae.
355. *Advanced Plant Systematics I*. I. 3 hr. PR: Biol. 151 or equiv. Taxonomy of pteridophytes, gymnosperms, and monocotyledons.
356. *Advanced Plant Systematics II*. II. 3 hr. PR: Biol. 151 or equiv. Taxonomy of dicotyledons.
357. *Aquatic Seed Plants*. I. 3 hr. PR: Biol. 1 and 2 or equiv. Classification, ecology, and economic importance of aquatic seed plants.
358. *Field Studies of Invertebrates*. S. 3 hr. PR: Biol. 1 and 2 or equiv. Taxonomy and ecology of the vertebrates.
359. *Field Studies of Vertebrates*. S. 3 hr. PR: Biol. 1 and 2 or equiv. Taxonomy and ecology of the invertebrates.
360. *Vascular Cryptogams*. II. 4 hr. PR: Biol. 1 and 2 or equiv. Taxonomy, anatomy, cytology, and ecology of the club mosses, horsetails, and ferns.
362. *Developmental Biology*. I. 4 hr. PR: Biol. 101, 102, 262 or equiv. and organic chemistry. The molecular and cellular basis of differentiation and morphogenesis.
364. *Advanced Plant Physiology*. I, II. 3 hr. PR: Biol. 169 or equiv., organic chemistry, general physics, and consent. Advanced studies of plant processes including recent advances in the field. I. Spring semester, off-numbered years — Water relations and mineral nutrition and translocation. II. Fall semester, odd-numbered years — Plant growth and development. III. Spring semester, even-numbered years — Environmental physiology.
366. *Plant Development*. II. 4 hr. PR: Biol. 102, organic chemistry or biochemistry. Experimental studies of plant growth and developments.
367. *Topics in Developmental Biology and Physiology*. I, II, S. 1-4 hr. PR: Consent. Topics in contemporary developmental biology and physiology. Topic will be selected by instructor for formal presentation.
368. *Problems in Developmental Biology and Physiology*. I, II, S. 1-4 hr. PR: Consent. Problems in contemporary developmental biology and physiology. Selection of problems to be determined in consultation with instructor.
369. *Seminar in Developmental Biology and Physiology*. I, II. 1 hr. Selected areas of developmental biology and physiology.
370. *Cytotaxonomy*. II. 3 hr. PR: Biol. 1 and 2, 151, Genet. 221, or consent. Determination of phylogenetic relationships by cytological and taxonomic methods.
390. *Seminar in Systematic and Evolutionary Biology*. I, II. 1 hr. per sem. PR: Consent. Selected areas of systematic and evolutionary biology.
391. *Topics in Systematics*. I, II, S. 1-4 hr. PR: Consent. Topics in contemporary systematics. Topic will be selected by instructor for formal presentation.
411. *Problems in Cellular and Molecular Biology*. I, II, S. 1-4 hr. PR: Consent. Problems in contemporary cellular and molecular biology.
443. *Advanced Plant Ecology*. II. 2-4 hr. PR: Biol 103 and 243 or equiv. Advanced field studies in plant ecology.

462. *Developmental Genetics*. II. 3 hr. PR: Courses in embryology and genetics. Genetic control mechanisms in regulation of developmental processes in eukaryotic organisms.
497. *Research*. I, II, S. 1-15 hr.

CHEMISTRY

The Department of Chemistry offers graduate studies leading to the degrees of Master of Arts, Master of Science, and Doctor of Philosophy with research concentration in the areas of analytical, inorganic, organic, physical, and theoretical chemistry. The Master of Science and Doctor of Philosophy degrees require completion of a research project which represents the principal theme about which the graduate program is constructed.

Applicants for graduate studies in chemistry must have as a minimum requirement a bachelor's degree. Applicants for the M.S. program must have a major or concentration in chemistry and an appropriate background in physics and mathematics. Persons with a sufficient background in science but without a major in chemistry may be admitted to the M.A. program. All entering graduate students in chemistry are required to take Departmental Guidance Examinations in the major areas of chemistry. These examinations, on the undergraduate level, are administered before registration and serve to guide the faculty in recommending a course program for the beginning graduate student. Deficiencies revealed on the Guidance Examinations need to be corrected in a manner prescribed by the faculty.

The general Graduate School requirements for the Master of Arts and Master of Science degrees are outlined elsewhere in this *Catalog*. Graduate students in the M.S. program in chemistry are required to submit a research thesis. They may apply up to 6 hours of research credit toward the Graduate School 30-hour requirement. The remaining 24 hours of credit must be earned in the basic graduate courses which reflect a diversified exposure to chemistry; no more than 10 hours may be elected outside the department. A final oral examination is administered after completion and submission of the thesis.

The M.A. program is designed for secondary school teachers who wish to increase their knowledge of chemistry and to enhance their teaching skills and for other persons who wish to gain a broad background in chemistry but who plan a career which will not emphasize research. The minimum requirement for the degree involves 36 hours of coursework, up to 15 hours of which may be earned outside the department.

The program for the degree of Doctor of Philosophy reflects a flexible, research-oriented approach geared to develop the interests, capability, and potential of mature students. A program of courses is recommended to suit individual needs based on background, ability, and maturity. These courses are classified as basic graduate courses which present the essentials of a given discipline on an advanced level, and specialized graduate courses which take one to the frontiers in a specific area of research. The course offerings are designed to provide guidelines from which students can launch their independent studies in preparation for candidacy examinations. Students are required to enroll in the departmental seminar program and are expected to attend special lectures and seminars offered by visiting chemists.

All graduate students in the Ph.D. program are expected to achieve a certain diversified background in the major areas of chemistry. In order to aid in this achievement, a departmental distribution requirement of one 3-hour credit course in each of the four major areas of chemistry selected from the following

course offerings must be met: Analytical 211, 413, or 414; Inorganic 423, 424, or 426; Organic 331, 332, or 433; Physical 250, 341, or 443. In addition, each major area in chemistry requires students in the discipline to enroll in basic graduate courses which present the essentials of that discipline on an advanced level.

Candidacy examinations consist of both a written and oral portion. The written examinations are of the cumulative type, and are offered eight times a year. The oral examination is based on a proposition for a research problem not intimately related to the student's own problem, or any particular research problem being actively pursued at WVU. This proposition is presented in writing to the student's research committee and defended before that group and any other interested faculty members.

In the area of physical chemistry, the written examination is a comprehensive examination based on one year of graduate study in physical chemistry. The examination is given once each semester as necessary.

Each candidate for the Ph.D. must satisfy a departmental language requirement in a language approved by the student's research committee.

Research, which is the major theme of graduate studies, may be initiated as early as the student and faculty feel appropriate for each individual case. Normally, a student will begin laboratory work no later than the second semester. Upon successful completion of an original piece of research, the candidate will present results in a Ph.D. dissertation and at the appropriate time defend the work in a final oral examination.

Chemistry

Note: A charge is made for excessive breakage in laboratory courses in addition to the nonrefundable laboratory fee listed.

Chem.

- 202. *Selected Topics*. I, II. 1-3 hr. PR: Written consent, with at least a 2.0 grade-point average in chemistry courses. Individual instruction under supervision of an instructor. (Lab fee \$20.00.)
- 210. *Instrumental Analysis*. II. 3 hr. PR: Chem. 246. Basic instrumentation of analytical measurements. Electronics and instrument design. Methods of electrochemical and spectrochemical analysis. 2 hr. lect., 3 hr. lab. (Lab fee \$20.00.)
- 211. *Intermediate Analytical Chemistry*. I. 3 hr. PR: Physical chemistry. Principles of analytical procedures and separations at an advanced level. 2 hr. lect., 3 hr. lab. (Lab fee \$20.00.)
- 220. *Techniques of Chemical Syntheses*. II. 2 hr. PR or Conc.: Chem. 222. Preparation and handling of inorganic and organic materials. Inert atmosphere vacuum system, high temperature and pressure, crystallization, distillation, sublimation, chromatography, non-aqueous solvents, and microscopy. Two 3-hr. lab. (Lab fee \$20.00.)
- 222. *Chemistry of Inorganic Compounds*. II. 3 hr. PR: Chem. 250. Correlation of reactions and properties of elements and compounds based on modern theories of chemical bonding and structure. Acid-base theory, non-aqueous solvents, ligand field theory, and stereochemistry. 3 hr. lect.
- 235. *Methods of Structure Determination*. I. 4 hr. PR: Chem. 134 and 136. Use of chemical methods and u.v., ir., n.m.r., e.s.r., Raman and mass spectroscopy to elucidate structures of organic compounds. For students in chemistry and related fields who may need these methods in research and applied science. 2 hr. lect., two 3-hr. lab. (Lab fee \$20.00.)

237. *Polymer Chemistry*. I or II. 3 hr. PR or Conc.: Chem. 246 or consent. Methods, mechanisms, and underlying theory of polymerization. Structure and stereochemistry of polymers in relation to chemical, physical, and mechanical properties. 3 hr. lect.
239. *Organic Syntheses*. II. 2 hr. PR: Chem. 136. Modern synthetic methods of organic chemistry. Two 3-hr. lab. (Lab fee \$20.00.)
241. *Crystallography*. I. 3 hr. PR or Conc.: Physical chemistry or consent. Applications of X-ray diffraction of crystals to the study of crystal and molecular structure. Includes theories of diffraction and crystallographic methods of analysis. 3 hr. lect.
243. *Introduction to Radiochemistry and Radiation Chemistry*. I. 3 hr. PR or Conc.: Physical chemistry. Fundamentals of radiochemistry and the use of tracer techniques. An introduction to radiation chemistry and how ionizing radiation interacts with matter. 2 hr. lect., 3 hr. lab. (Lab fee \$20.00.)
244. *Colloid and Surface Chemistry*. II. 2 hr. PR: Physical chemistry. Selected topics in the properties and physical chemistry of systems involving macromolecules, lyophobic colloids, and surfaces. 2 hr. lect.
246. *Physical Chemistry*. I. 3 hr. PR: Chem. 18 or 115, Math. 16, and Physics 12. A first course in physical chemistry. Topics include a study of thermodynamics and chemical equilibria. 3 hr. lect.
247. *Physical Chemistry Laboratory*. I. 1-2 hr. PR or Conc.: Chem. 246. Experimentation illustrating the principles of physical chemistry and offering experience with chemical instrumentation. One or two 3-hr. lab. (Lab fee \$20.00.)
248. *Physical Chemistry*. II. 3 hr. PR: Chem. 246 and Math. 17. Continuation of Chem. 143. Chemical dynamics and the structure of matter. 3 hr. lect.
249. *Physical Chemistry Laboratory*. II. 1-2 hr. PR: Chem. 246, 247, 248, or concurrent enrollment. Continuation of Chem. 145. One or two 3-hr. lab. (Lab fee \$20.00.)
250. *Chemical Bonding and Molecular Structure*. I. 3 hr. PR: Chem. 210, 248. Introduction to the quantum theory of chemical bonding. Atomic structure, theoretical spectroscopy, predictions of molecular structures and bond properties. 3 hr. lect.
331. *Advanced Organic Chemistry I*. I. 3 hr. PR: Chem. 134. Structural concepts, bonding, tautomerism, static and dynamic stereochemistry, mechanistic classifications of reagents, and reactions including some applications. 3 hr. lect.
332. *Advanced Organic Chemistry II*. II. 3 hr. PR: Chem. 331. Continuation of Chem. 331 with emphasis upon synthetic methods and reaction mechanisms. 3 hr. lect.
341. *Chemical Thermodynamics*. II. 3 hr. PR: Chem. 248. Principles of classical and statistical thermodynamics and their application to chemical problems. 3 hr. lect.
- 411, 412. *Seminar in Analytical Chemistry*. I, II. 1 hr. per sem. Current literature and research.
413. *Electrochemistry and Instrumentation*. II. 3 hr. PR: Chem. 210. Electronic instrumentation applied to study of mass transfer, kinetics of electrode reactions, voltammetry, and high-frequency methods. 3 hr. lect.
414. *Spectroscopic Methods*. I. 3 hr. PR: Chem. 210. Problems in design of instruments for each of the various spectral regions. 3 hr. lect.
- 417, 418. *Advanced Topics in Analytical Chemistry*. I, II. 1-3 hr. per sem. Recent advances and topics of current interest.
- 421, 422. *Seminar in Inorganic Chemistry*. I, II. 1 hr per sem. Current literature and research.
423. *Advanced Inorganic Chemistry*. I. 3 hr. PR: Chem. 222. Bonding theories, stereochemistry, non-aqueous solvent systems, physical methods and current topics. 3 hr. lect.

424. *Coordination Chemistry*. II. 3 hr. PR: Chem. 250, corequisite Chem. 250. Ligand field theory, spectral interpretations, stability considerations, synthetic methods, unusual oxidation states, organometallic compounds, other topics of current interest. 3 hr. lect.
425. *Inorganic Reactions and Mechanisms*. I or II. 2 hr. PR: Chem. 423, 424, and 443. Substitution, isomerization, racemization, and oxidation-reduction reactions. 2 hr. lect.
426. *Chemistry of Non-Metals*. I or II. 2 hr. PR: Chem. 222. Electrodeficient compounds, sulfur-flourine chemistry, inorganic polymers, rare gas compounds, solid-state chemistry of silicon and germanium, other topics of current interest. 2 hr. lect.
- 427, 428. *Advanced Topics in Inorganic Chemistry*. I, II. 1-3 hr. per sem. Recent advances and topics of current interest.
- 431, 432. *Seminar in Organic Chemistry*. I, II. 1 hr. per sem. Current literature and research.
433. *Physical Organic Chemistry*. I. 3 hr. PR: Chem. 331. Theoretical considerations of organic molecules, kinetics and other methods used in the study of organic structure and reaction mechanisms, linear free energy relationship and other related topics. 3 hr. lect.
436. *Heterocyclic Chemistry*. I or II. 3 hr. PR: Chem. 331. Major heterocyclic systems and discussion of selected natural products containing heterocycles. 3 hr. lect.
- 437, 438. *Advanced Topics in Organic Chemistry*. I, II. 1-3 hr. per sem. Recent advances and topics of current interest.
- 441, 442. *Seminar in Physical Chemistry*. I, II. 1 hr. per sem. Current literature and research.
443. *Chemical Kinetics*. I. 3 hr. PR: Chem. 248. Theories and applications of kinetics in gaseous state and in solution. 3 hr. lect.
444. *Statistical Mechanics*. I or II. 3 hr. PR: Chem. 446. Theory and application of statistical mechanics to chemical systems. 3 hr. lect.
445. *Theoretical Chemistry I*. II. 3 hr. PR: Differential equations. Theoretical background for quantum mechanics. 3 hr lect.
446. *Theoretical Chemistry II*. I. 3 hr. PR: Chem. 445. Theories and applications of quantum mechanics in chemistry. 3 hr. lect.
447. *Molecular Spectroscopy and Structure*. II. 3 hr. PR: Chem. 446. Advanced applications of spectral methods to a study of molecular structure. 3 hr. lect.
- 448, 449. *Advanced Topics in Physical Chemistry*. I, II. 1-3 hr. per sem. Recent advances and topics of current interest.
490. *Teaching Practicum*. I and II. 1-3 hr. PR: Consent. Supervised practices in college teaching of chemistry.
491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
492. *Research Seminar*. I, II, S. 1 hr. PR: Graduate student in chemistry. Research seminars by visiting lecturers. (Grading will be S/U.)
497. *Research*. I, II. 1-15 hr.
499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking coursework credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

ENGLISH LANGUAGE AND LITERATURE

Master of Arts

Admission. To be admitted to the Department of English as a prospective candidate for the degree of Master of Arts, a student is expected to have completed work comparable to the department's undergraduate requirement for English majors and to present a record distinctly above the average.

If as an undergraduate the applicant majored in English, the general average of grades in all English courses must be no lower than B. If the applicant's average in all English courses is lower than B, the Committee on Admissions may extend a "Probational Admission" for one semester, at the end of which the student's status will be determined by the Committee.

If as an undergraduate the applicant majored in a subject other than English, the student will be admitted only on condition that the student fulfills, to the extent of the particular deficiency, the normal course and credit obligations of the undergraduate English major at WVU. Such an admission is termed a "Conditional Admission."

Course Requirements. A candidate for the M.A. degree will be expected to complete courses covering the major periods and the works of the major authors of English literature. The minimum requirement is 30 hours of graduate work.

Examinations. In addition to the final oral examination related particularly to the student's field of special interest as reflected in the master's thesis, a graduate student in English is required to take two 3-hour comprehensive written examinations in English and American literature. The student will normally take these examinations in the semester or term following that in which the student has established acceptable credit in 24 hours of graduate course work with an average of 3.0. The examinations will be conducted not later than four weeks before the last day of classes of a semester, or three weeks before the end of a summer term. With the permission of the Examining Committee, an unsuccessful candidate may be re-examined. Success in the examination admits the student to candidacy for a graduate degree.

Thesis. A student shall be required to write a thesis of a type and on a subject approved by the department. The student will write under the supervision of a thesis adviser. Information about the procedure of the dates for filing application for approval of projects, and about dates for submission of theses, is available at the office of the department. The thesis may be a work of scholarship, or criticism, or of creative writing (original poetry, drama, or fiction). The thesis shall count for 6 hours of graduate credit.

Foreign Language Requirement. A candidate for the degree of Master of Arts in English must have completed studies in a foreign language equivalent to 12 semester hours of college work. If an applicant does not meet this requirement, the applicant may prepare to meet it through independent study, or otherwise, in order to show a reading knowledge on examination.

Doctor of Philosophy

Admission. An applicant for admission to the program will be judged on the basis of academic record, on three recommendations from former teachers, and on a personal, written statement outlining the applicant's academic and professional goals. The applicant may also submit, as an option, the results of the Graduate Records Examinations.

Provisional admission to the program may be granted to students whose credentials, while not exhibiting the high standards of prior academic achievement the department expects of doctoral candidates, promise excellence in the graduate study of English literature. Students admitted provisionally are expected to show high academic achievement during their first semester of doctoral study. All decisions on admission and status shall be made by the Graduate Admissions Committee.

Course Requirements. The doctoral program will normally require three years of full-time study beyond the master's degree or its equivalent. Thirty hours of credits in courses of the 300 and 400 series are normally required; however, exceptionally well-prepared students may be granted permission to take fewer than 30 hours of course work, upon recommendation of the Graduate Admissions Committee, in consultation with the Graduate Coordinator and the student's adviser. Of the normally required 30 hours, 12 must be taken in 400 level courses.

No credit will be given for courses in which the grade is C or less. A student who makes C or less in more than three courses will be dropped from the program.

The writing of the doctoral dissertation will carry a value of 12 additional hours.

Preliminary Qualifying Examinations. Sometime during the student's first two years of study in the doctoral program, in order to remain in the program, the student must pass a Preliminary Qualifying Examination, a 6-hour comprehensive written examination in English and American literature.

Examinations for Formal Admission to Candidacy. During the semester in which the student completes the coursework, or soon thereafter, the student may qualify for formal admission to candidacy for the Ph.D. degree by successful completion of examinations in the fields of concentration chosen from the list in Group 1 (below). These examinations shall be:

1. Two 3-hour written examinations drawn up from Group 1 by the adviser and the student's examination committee;
2. and one of the following options:
 - a. one 3-hour written examination drawn up from Group 2 by the adviser and examination committee,
 - b. one 3-hour written examination on a major author selected by the adviser and examination committee.

Fields of Concentration. For purposes of academic convenience, fields of concentration are listed as follows. Acceptance of a candidate for specialization in a given field will depend on the staff and other resources of the Department at the time of application.

Group 1 — Periods: a. Early and Middle English Language and Literature; b. The Renaissance; c. Restoration and Eighteenth-Century Literature; d. Romanticism; e. The Victorian Era; f. The Modern Period; g. American Literature.

Group 2 — Genres, Types, and Other Fields: a. Folklore and Folk Literature; b. English Linguistics and Philology; c. English Drama; d. Prose Fiction; e. Epic and Romance; f. Lyric Poetry; g. Non-fiction Prose; h. Literary Criticism.

Final Examination. When the dissertation has been accepted and approved by the candidate's adviser and the dissertation committee, the candidate will be given an oral examination by the committee. The examination will deal with the dissertation and the field it represents.

Teaching Requirement. After or during the completion of the coursework, the doctoral student must teach successfully in the department for two semesters, one semester devoted to composition, the other to literature. Concurrent with the teaching practicum, the student must take one 400-level course in the teaching of composition and one 400-level course in the teaching of literature. This requirement will be optional for those candidates who possess teaching experience approved by the department. The student fulfilling this requirement will be designated a Teaching Fellow, an appointment equivalent to a "Part-time Instructorship" in the University.

Minor Subject. A student may complete all minor work in the Department of English, or the student may choose a minor, not to exceed 12 hours in 300 or 400 level courses in a related subject offered by another department. Choice of the minor is subject to the approval of the Graduate Coordinator or a designate.

Foreign Language Requirement. A graduate student must demonstrate proficiency in a foreign language acceptable to the Department of English. This requirement may be fulfilled either by passing a Graduate Reading Examination or by taking a minimum of two upper-division courses in the literature of the chosen language, which must be passed with a grade of A or B.

Doctoral Dissertation. After completing coursework, passing the examinations for formal candidacy, and fulfilling the language requirement and teaching requirements, a student shall submit a prospectus of the dissertation, as specified by the Department, to the adviser. On approval of the prospectus by the student's dissertation committee, the student may apply for admission to candidacy for the Ph.D. degree.

The topic of the proposed dissertation should be such that a candidate can reasonably complete the project in one year of full-time work. It is the responsibility of the dissertation committee and adviser to see that the topic is sufficiently limited.

English

201. *Creative Writing.* II. 3 hr. PR: English 101, 102 or 103 or their equiv. or consent. Advanced workshop in creative writing, for students who are seriously engaged in the writing of a major work.
210. *Structure of the English Language.* I, II. 3 hr. Historical, comparative, and descriptive grammar, together with an introduction to English linguistics.
211. *History of the English Language.* I. 3 hr. Study of the nature of the language; questions of origins, language families, development, relationships of English as one of the Indo-European languages.
220. *American Poetry.* I. 3 hr. Study of major American poets of the nineteenth and twentieth centuries — Bryant, Poe, Emerson, Longfellow, Whitman, Dickinson, Frost, and Eliot. Primary emphasis on their poetry as poetry; background materials minimized.
230. *Modern American Biography.* I. 3 hr. Selection of most significant and interesting biographies and autobiographies of Americans of distinction in literature, arts, and public life.
231. *Modern British Biography.* II. 3 hr. Representative biographies and autobiographies of important British figures in public life and arts, chosen for their literary value and their interest and relevance in contemporary life.
232. *Literary Criticism.* II. 3 hr. History of literary criticism from Aristotle to modern times.

233. *Recent Literary Criticism*. I, II. 3 hr. Brief survey of theories and essays of five major schools of modern criticism and an application of these theories to a novel, a play, and to selected poems and short stories.
234. *Modern Drama*. II. 3 hr. World drama from Ibsen to the present day.
235. *American Drama*. II. 3 hr. Representative American Dramas and history of theatre in America.
236. *Tragedy*. II. 3 hr. Masterpieces of tragedy from Greek times to modern, with consideration of changing concepts of tragedy and of ethical and ideological values reflected in works of major tragic authors.
240. *Folk Literature*. I. 3 hr. The folk ballad, its origin, history, and literary significance, based on Child's collection and on American ballad collections.
241. *Folk Literature of the Southern Appalachian Region*. II. 3 hr. Traditional literature of southern Appalachian region, including songs, prose, tales, languages, customs, based on material collected in the region — especially in West Virginia.
250. *Shakespearean Comedies and History Plays*. I. 3 hr. Representative comedies of Shakespeare against the background of classical and Renaissance theory and practice, and of selected history plays.
251. *Shakespearean Tragedy*. II. 3 hr. Principal tragedies of Shakespeare, together with the history of criticism, scholarly investigation, and interpretation.
255. *Chaucer*. I. 3 hr. Early poems, *Troilus and Criseyde*, and *The Canterbury Tales*. In addition to an understanding and appreciation of Chaucer's works, the student is expected to acquire an adequate knowledge of Chaucer's language.
256. *Milton*. II. 3 hr. All of Milton's poems and a few selected prose works.
261. *Sixteenth Century Prose and Poetry*. I. 3 hr. Studies from Caxton to Bacon, from Skelton to Shakespeare.
262. *Seventeenth Century Prose and Poetry*. II. 3 hr. Studies from Donne to Dryden.
263. *Literature of the Eighteenth Century*. I. 3 hr. Literature of the period 1660-1744 in relation to social, political, and religious movements of the time.
264. *Literature of the Eighteenth Century*. II. 3 hr. Continuation of English 263, covering the latter half of the century. May be taken independently of English 263.
265. *The Romantic Movement*. I. 3 hr. Works of Wordsworth, Coleridge, and Keats, together with an introduction to works of scholarship in English Romanticism.
266. *American Romanticism*. II. 3 hr. Writings of Ralph Waldo Emerson, Henry David Thoreau, and Nathaniel Hawthorne. A study of relations of these men to history of their own time. Their contributions to American thought and art.
267. *Victorian Poetry*. I. 3 hr. The major Victorian poets — Tennyson, Browning, Arnold, Rossetti, Morris, Swinburne, Fitzgerald — and a few of the later Victorian poets.
268. *Modern British Poetry*. I. 3 hr. British poetry from 1880 to present, including the Decadents, Counter-Decadents, Hopkins, Housman, Hardy, the Georgians, the Imagists, World War I poets, Yeats, Eliot, the Auden Group, and post-World War II poets.
280. *Southern Writers*. II. 3 hr. Examination of twentieth-century Southern essayists, poets, short-story writers, and novelists in relation to ideological background.
283. *Study of Selected Authors (American)*. I, II. 3 hr. Study of the works of a principal American author, or more than one.
284. *Study of Selected Authors (English)*. I, II. 3 hr. Study of the works of one or more of the principal English authors.

286. *Black American Fiction*. II. 3 hr. Survey of novels and short stories written by black Americans from 1890 to the present.
288. *Women Writers in England and America*. II. 3 hr. PR: Previous courses in English or consent. Syllabus may vary from year to year to include women writers in a particular country, historical period, or genre; or writing on a particular theme.
290. *Independent Study*. I, II. 1-3 hr. PR: Consent. With departmental consent, may be repeated for a maximum of 9 credit hours. Individual study of literary, linguistic, and writing problems.
291. *Special Topics*. I, II. 3 hr. PR: Consent. With departmental consent, may be repeated for a maximum of nine credit hours. (Credit received for repeating English 291 only when content of course is different.) Topics in literature, language, or writing.
310. *Old English (I)*. I. 3 hr. Study of Anglo-Saxon with selected readings from the literature of the period.
311. *Old English (II)*. II. 3 hr. PR: English 310. *Beowulf* and other texts in Old English.
312. *Approaches to Teaching Composition*. S. 3 hr. PR: English 1, 2. Survey of techniques of teaching writing in elementary and secondary schools. Opportunities for students to write, to analyze their writing, and to experiment in class with various methods of teaching writing.
330. *Early English Drama*. I. 3 hr. Study of the medieval and early Tudor drama to the age of Shakespeare.
331. *Elizabethan Drama*. II. 3 hr. Study of dramas of Shakespeare's contemporaries and successors to the closing of the theatres in 1642. Includes Kyd, Marlowe, Jonson, Heywood, Chapman, Webster, Beaumont, and Fletcher.
332. *Restoration and Eighteenth Century Drama*. II. 3 hr. Comedy, tragedy, the heroic play, the drama of sensibility and the reaction against it: Etherege, Wycherley, Farquhar, Congreve, Vanbrugh, Dryden, Otway, Goldsmith, and Sheridan.
334. *Contemporary Drama*. II. 3 hr. Recent developments in the drama, with special attention to Miller, Williams, Sartre, Anouilh, Osborne, Pinter, Bolt, and the Absurdist. Content altered as new playwrights representing new developments come into prominence.
335. *The English Novel to the Time of Scott*. I. 3 hr. Study of the English novel from the sixteenth century to the time of Scott, showing the development of the novelistic art from early narrative beginnings.
336. *The English Novel, 1832-1900*. II. 3 hr. Continuation of English 335. Development of the English novel from the early nineteenth century to the beginning of the twentieth century.
337. *The Modern Novel*. I. 3 hr. Twentieth-century novel, with emphasis on works of selected British novelists.
340. *The American Novel to 1915, I*. I. 3 hr. History of American novel, based on reading of ten or twelve novels, from the beginning to World War I.
341. *The American Novel, II*. II. 3 hr. History of the American novel, based on readings of ten to twelve novels from World War I to the present.
350. *Shakespeare*. I. 3 hr. Intensive study of selected plays. Special attention to textual problems and to language and poetic imagery, together with the history of Shakespearean criticism and scholarship.
355. *Spenser*. I. 3 hr. A study of Spenser's poetry, minor poems, and *The Faerie Queene*, forms and sources, purpose of the great epic, social, political, and religious allegory.
356. *Byron and Shelley*. II. 3 hr. Reading and study of the works of two poets of the later Romantic Movement, together with works of criticism and scholarship related to the period.

365. *Victorian Prose*. II. 3 hr. Study of the non-fictional writings of the great Victorian prose critics: Carlyle, Ruskin, Arnold, Newman, Macaulay, Huxley, and Morris.
366. *English Literature, 1880-1918*. II. 3 hr. Study of the more important writers and literary movements of the late Victorian and the Edwardian periods; emphasis on Hardy, Housman, Hopkins, Henley, Pater, Gissing, Moore, Butler, and writers of the "Aesthetic Movement."
369. *American Literature to 1830*. I. 3 hr. Study of American literature and its informing cultural milieu and early national periods, 1607-1830.
370. *American Literature, 1830-65*. II. 3 hr. Study of the literature of the Romantic period in American literature, concentrating on Emerson, Thoreau, Poe, Hawthorne, and Melville.
371. *American Literature, 1865-1915*. I. 3 hr. Study of the literature of transcendentalism, realism, and naturalism in America between the Civil War and World War I, concentrating on Whitman, Twain, James, Dickinson, Crane, Adams, and Dreiser.
372. *American Literature, 1915-Present*. II. 3 hr. A study of American prose, poetry, and drama since 1915.
391. *Approaches to Teaching Composition*. S. 3 hr. Surveys attitudes toward and techniques of teaching writing in elementary and secondary schools. Provides frequent opportunities for students to write, to analyze their writing, and to experiment in class with various methods of teaching writing to children and young adults. Special attention to formulating writing assignments and to devising effective methods of evaluation and grading. (Not for credit in the Ph.D. program.)
400. *Thesis*. I, II. 3 hr.
401. *Thesis*. I, II. 3 hr.
440. *Medieval Literature*. I. 3 hr. Topics from English literature, 1100-1500, exclusive of Chaucer and the drama.
441. *Chaucer*. I. 3 hr. The early poems, *Troilus and Criseyde*, and *The Canterbury Tales*.
446. *Renaissance Literature*. I. 3 hr. Studies devoted to a major non-dramatic writer of the period.
447. *Renaissance Literature*. II. 3 hr. Studies devoted to a major topic of the period.
450. *Shakespeare*. I. 3 hr.
- 456, 457. *Folklore and Folk Literature. Seminar*. I, II. 3 hr. per sem. PR: Graduate standing. Research projects in folklore, including field work in collecting folklore in the Appalachian region and the analysis of the use of folklore in the works of British and American authors.
460. *Seminar in Eighteenth Century Studies: Selected Authors*. I. 3 hr. Research concentrating on a major writer or group of writers.
461. *Seminar in Eighteenth Century Studies: Selected Topics*. II. 3 hr. Research into unifying ideas, genres, or problems in the period.
- 470, 471. *Romanticism*. I, II. 3 hr. per sem. PR: Graduate standing. Studies in major authors and special topics in the field of English Romanticism.
- 476, 477. *Doctoral Seminar in Victorian Studies*. I, II. 3 hr. per sem. Research and discussion in selected topics in the literature and history of the period. Intended to prepare doctoral candidates for writing of dissertation.
- 484, 485. *Seminar*. I, II. 3 hr. PR: Graduate standing. Seminar in principal authors and movements in American literature from Colonial Period to 1870, with emphasis on topics and authors announced in the schedule.

- 486, 487. *American Literature, 1870-*. I, II. 3 hr. per sem. PR: Graduate standing. Literary and intellectual America from 1870 to 1914 in terms of leading literary men and changing cultural patterns of the period. Discussion and analysis of selected prose and poetic works.
490. *Teaching Practicum*. I, II. 3-6 hr. PR: Graduate standing. I. Supervised practices in college teaching of expository writing. II. Supervised practices in college teaching of literature.
491. *Advanced Study*. I, II. 3 hr. PR: Graduate standing. Specific topics approved by the instructor.
492. *Introduction to Literary Research*. I, II. 3 hr. Bibliography; materials and tools of literary investigations; methods of research in various fields of literary history and interpretation; problem of editing. Practical guidance in the writing of theses.
494. *Seminar*. I, II. 3 hr. PR: Graduate standing. Specific authors to be approved by instructor.
496. *Seminar*. I, II. 1 hr. PR: Consent. Research paper to be presented orally to the faculty and students of the Department of English.
497. *Research*. I, II. 1-15 hr. PR: Consent.
498. *Doctoral Thesis*. I, II. 1-6 hr. PR: Consent.
499. *Graduate Colloquium*. I, II. 1-6 hr. PR: Consent.

FOREIGN LANGUAGES

The Department of Foreign Languages offers graduate study in French, German, Greek, Latin, and Spanish literature and culture, in linguistics, in language teaching methods, and in bibliography and research. Candidates for the master's degree are accepted in French, German, and Spanish.

A student who wishes to do graduate work in the department should apply to the chairman, who will serve as temporary adviser until an advisory committee is appointed to direct the student's work. The committee will be formed toward the end of the first semester or the beginning of the student's second semester. The student, together with the committee, will draw up a tentative program which can be changed only upon approval of the committee and the department chairman. The student will be expected to have an undergraduate major in the foreign language of interest or be required to make up certain deficiencies. The student should normally show an average of a 3.0 (B) in undergraduate foreign language courses.

A candidate must complete at least 36 graduate hours for a master's degree, 24 to 27 hours of which, including Bibliography and Research 365, will be in the major field. All graduate assistants are required to complete Language Teaching Methods 421 as part of the work in the major fields unless they have had a similar course in their undergraduate study. Six hours of the major work may be in the form of a master's thesis. The candidate's committee, together with the student, will determine the distribution of courses and the thesis requirement in the light of the student's aims and needs. The committee also will administer written and oral comprehensive examinations near the end of the candidate's course of study.

Graduate assistants are required to enroll each semester in LTM 490, although these credits do not count toward the master's.

Special Summer Courses of Study Abroad

These courses are currently offered in Spanish and French, and German, and are listed in the WVU *Summer Session Bulletin*, but they usually begin early, before the end of May, and end around the first of July. Spanish courses are held at the University of Antioquia in the Republic of Colombia; French courses are conducted at Deauville in France; in Germany classes are held in Wilhelmshaven. Students normally register for two courses at WVU, but all work is carried on overseas.

Bibliography and Research

365. *Methods of Research*. I. 3 hr.

Classics

201. *Roman Novelists*. I. 3 hr. PR: Classics 109, 110, or equiv.
202. *Romance Comedy*. II. 3 hr. PR: Classics 109, 110, or equiv.
235. *Roman Epic*. I. 3 hr. PR: Classics 109, 110, or equiv.
237. *Roman Lyric Poetry*. I. 3 hr. PR: Classics 109, 110, or equiv.
292. *Pro-Seminar in Latin or Greek Literature*. 1-6 hr. Special topics.
392. *Seminar in Latin or Greek Literature*. 1-6 hr. Special topics.

French

203. *Conversational French*. I. 3 hr. PR: French 110 or consent. Intensive spoken French.
217. *French Civilization*. II. 3 hr. PR: 12 hr. of French.
221. *The Romantic Movement*. I. 3 hr. PR: A.B. in French or consent.
222. *French Realism*. II. 3 hr. PR: A.B. in French or consent.
229. *Literature of the Sixteenth Century*. I. 3 hr. PR: A.B. in French or consent.
231. *Phonetics and Pronunciation*. II. 3 hr. PR: 18 hr. of French or equiv.
292. *Pro-Seminar*. 1-6 hr.* Special topics.
305. *Fundamentals for Reading French*. I. 3 hr. PR: Graduate status or upper-division status. French 305-306 is intended for graduate students from other departments to teach them to read general and technical French.
306. *Reading French*. II. 3 hr. PR: 12 hr. of French or equiv. or French 305. Graduate students may meet the doctoral foreign language requirements by achieving a grade of B or better in this course. Not open to foreign language departmental majors.
326. *Literary Criticism*. II. 3 hr. PR: A.B. in French or consent.
337. *Moliere*. II. 3 hr. PR: A.B. in French or consent.
344. *Explication de Textes*. II. 3 hr. PR: 18 hr. of French or equiv.
371. *The Modern Novel to 1930*. I. 3 hr. PR: A.B. in French or consent.
372. *The Novel After 1930*. II. 3 hr. PR: A.B. in French or consent.
381. *Medieval French Literature*. II. 3 hr. PR: Linguistics 390.
392. *Seminar*. 1-6 hr.* Special topics.
497. *Research*. 1-15 hr.

*Variable credit courses normally carry 3 hr. credit. Exceptions are made only in emergencies and must be approved by the department chairman and the professor teaching the course.

German

242. *Faust*. II. 3 hr. PR: German 4 or consent. Critical study of Goethe's *Faust*.
243. *Medieval German Literature*. I. 3 hr. PR: German 4 or consent.
244. *German Literature of the Reformation and Renaissance*. II. 3 hr. PR: German 4 or consent.
245. *Classicism and Romanticism*. I. 3 hr. PR: German 4 or consent. A critical study of German literature from 1750 to 1830.
246. *The Liberal Age*. II. 3 hr. PR: German 4 or consent. A critical study of German literature from 1830 to 1880, with an emphasis upon poetic realism.
247. *The Age of Crisis*. I. 3 hr. PR: German 4 or consent. A critical study of German literature from 1880 to present.
265. *German Civilization*. I. 3 hr. PR: 12 hr. of German or consent. A general comprehensive survey of the most important aspects of German culture, including a brief historical background, the development of the German language, geography, science, music, art, architecture, literature, and philosophy.
292. *Pro-Seminar*. 1-6 hr.* Special topics.
301. *Independent Reading*. I. 3 hr. Supervised reading for students who wish to do intensive work in any field of interest.
302. *Independent Reading*. II. 3 hr. Continuation of German 301.
305. *Fundamentals for Reading German*. I. 3 hr. PR: Graduate status or upper-division status. German 305-306 is intended for graduate students from other departments to teach them to read general and technical German.
306. *Fundamentals for Reading German*. II. 3 hr. PR: 12 hr. of German or equiv. or German 305. Graduate students may meet the doctoral foreign language requirements by achieving a grade of B or better in this course. Not open to foreign language departmental majors.
361. *Lyric Poetry*. I. 3 hr. PR: 18 hr. of German or consent.
375. *The Modern Novel*. I. 3 hr. PR: 18 hr. of German. Supervised reading of nineteenth century novels.
376. *The Modern Novel*. II. 3 hr. Continuation of German 375, with emphasis on recent fiction.
392. *Seminar*. 1-6 hr.* Special topics.
497. *Research*. 1-15 hr.

Russian

211. *The Russian Novel*. I. 3 hr. PR: Russian 3 and 4 or consent. Study of selected work of Gogol, Goncharov, Turgenev, Leskov, Dostoyevsky, and Tolstoy.
212. *The Russian Novel*. II. 3 hr. Continuation of Russian 211. Study of Russian prose from Chekhov to the post-war Soviet novelists.
213. *Survey of Russian Literature in Translation*. I. 3 hr. PR: Junior standing, or consent. Major works of Russian authors from the beginning to 1880 including those of Pushkin, Lermontov, Gogol, Turgenev, Dostoyevsky, and Tolstoy. Russian majors to read selections in the original.

214. *Survey of Russian Literature in Translation*. II. 3 hr. PR: Junior standing or consent. Continuation of Russian 213. The major literature of the Soviet Union from 1880 to the present. Russian majors to read selections in the original.
305. *Fundamentals for Reading Russian*. I. 3 hr. PR: Graduate status or upper-division status. Russian 305-306 is intended for graduate students from other departments to teach them to read general and technical Russian.
306. *Fundamental for Reading Russian*. II. 3 hr. PR: 12 hr. of Russian or equiv. or Russian 305. Graduate students may meet the doctoral foreign language requirements by achieving a grade of B or better in this course. Not open to foreign language departmental majors.

Language Teaching Methods

LTM

221. *The Teaching of Foreign Languages*. I. 3 hr. Required of all students who are prospective foreign language teachers on the secondary level.
222. *Language Laboratory Techniques*. II. 3 hr.
421. *Teaching Foreign Languages in College and University*. I. 3 hr. The theories and practices of contemporary foreign language teaching at the college level. Required of all graduate assistants in the Department of Foreign Languages.
490. *Teaching Practicum*. I, II. 1-6 hr. Required each semester of all graduate assistants in Department of Foreign Languages.
497. *Research*. 1-15 hr.

Linguistics

201. *Linguistics As Applied to Spanish-American Dialects*. I. 3 hr. PR: A.B. in Spanish or consent. To acquaint students with the principles of structural linguistics and those points of structure and vocabulary in which American Spanish differs from standard Castilian.
225. *Comparative Grammar of Greek and Latin*. I. 3 hr. PR: Consent.
226. *Italic Dialects*. II. 3 hr. PR: Consent.
227. *Vulgar Latin*. II. 3 hr. PR: Latin 109, 110, or equiv. Selections from Latin inscriptions and later Latin literature are studied to illustrate the development of the Latin language from its earliest times to its passing into Romance languages.
231. *The Structure of Modern Russian*. I. 3 hr. PR: 12 hr. of Russian or consent. Advanced study of Russian morphology and syntax.
232. *The Structure of Modern Russian*. II. 3 hr. PR: Linguistics 231 or consent. Advanced study of Russian morphology and syntax.
251. *History of the German Language*. I. 3 hr. PR: 18 hr. of German or consent. Historical development of standard German with emphasis on its relationship to the other Germanic languages and dialects.
255. *History of the Spanish Language*. I. 3 hr. PR: A.B. in Spanish or consent. A study of the development of the Spanish language and of the transformation of the Castilian dialect into the national language of Spain.
292. *Pro-Seminar*. 1-6 hr.* Special topics.
311. *Middle High German*. I. 3 hr. PR: 12 hr. of German from upper division. Study of the linguistic developments of Middle High German from the eleventh to the fifteenth centuries with illustrative reading from the *Nibelungenlied*.

- 312. *Middle High German*. II. 3 hr. Continuation of Linguistics 311 with illustrative readings from the Middle High German lyric poets and the courtly epics.
- 352. *Comparative Germanic Linguistics*. II. 3 hr. PR: Linguistics 251 or consent. A comparative study of Gothic, Old English, Old Norse, Old High German, and Old Saxon.
- 390. *Old French*. II. 3 hr. PR: Consent.
- 392. *Seminar*. 1-6 hr.* Special topics.
- 396. *Old Spanish*. II. 3 hr. PR: Consent.
- 497. *Research*. 1-15 hr.

Spanish

- 221. *Literature of the Golden Age to 1635*. I. 3 hr. PR: 18 hr. of Spanish, or equiv.
- 222. *The Golden Age After Lope De Vega*. II. 3 hr. PR: 18 hr. of Spanish, or equiv.
- 223. *Estudios De Estillo*. I. 3 hr. PR: 18 hr. of Spanish, or equiv.
- 292. *Pro-Seminar*. 1-6 hr.* Special topics.
- 315. *Lyric Poetry*. I. 3 hr. PR: 12 hr. of Spanish, or equiv.
- 324. *Explicacion De Textos*. II. 3 hr. PR: 18 hr. of Spanish, or equiv.
- 325. *The Picaresque Novel*. I. 3 hr. PR: 18 hr. of Spanish, or equiv.
- 327. *Graduate Reading in Spanish*. No credit. A special course to help students prepare for the Ph.D. reading examination in Spanish.
- 391. *Cervantes*. II. 3 hr. PR: 18 hr. of Spanish or consent.
- 392. *Seminar*. 1-6 hr.* Special topics.
- 395. *Sixteenth Century Literature*. I. 3 hr. PR: 18 hr. of Spanish or consent.
- 497. *Research*. 1-15 hr.

GEOLOGY AND GEOGRAPHY

The Department of Geology and Geography offers work leading to the degrees of Master of Arts, Master of Science, and Doctor of Philosophy in Geology. No graduate degree is offered in Geography.

Master of Arts

This degree enables the holder of a baccalaureate degree to become well acquainted, although not professionally trained, in the earth and environmental sciences. The program is directed toward regional planners, teachers, businessmen, research administrators, and students interested in environmental aspects of earth sciences.

The Master of Arts degree is either for (1) teachers who wish to increase their geological knowledge in order to instruct earth science in secondary schools better, or (2) people who are from another related discipline who are deficient in geology and are interested in environmental problems involving geology but not enough to consider them professional geologists. The second type of person recognizes the multidisciplinary importance of a complex subject such as environmental science without becoming a specialist in any particular

*Variable credit courses normally carry 3 hr. credit. Exceptions are made only in emergencies and must be approved by the department chairperson and the professor teaching the course.

area. This person most likely will serve as a planner rather than as a scientist. A person can select environmental problems in the Master of Science program and will have a strong geological background for his study.

Acceptance by the Graduate School and also by the Department of Geology and Geography is necessary before admission of any prospective student to the program. One departmental requirement is previous college study of earth sciences or related subjects. This requirement may be fulfilled by an undergraduate major (or first teaching field) in biology, chemistry, physics, engineering, regional planning, earth science, geography, or economics. In cases of an exceptional candidate, other fields will be considered.

The *minimum* work involves 36 hours and if the thesis option is elected, the research hours may be included in this total. Up to 18 hours of cognate work at the graduate level (in biology, chemistry, physics, engineering, mathematics, education, geography, statistics, and closely related social sciences) may be included in this program. Additionally, it is expected that all candidates maintain a 3.0 grade-point average while enrolled in this program. If the thesis option is not elected, the writing and oral presentation of a major research paper must be completed.

Master of Science

Before being admitted to candidacy for the Master of Science degree in geology, the student must have completed the equivalent of the courses listed in the College of Arts and Sciences in the *Undergraduate Catalog* as curricular requirements for undergraduates majoring in geology. Students who have not had a year of physics, a year of chemistry, and mathematics through Math. 15 (Calculus I), will be required to meet these requirements. They therefore will spend more than the minimum time for the Master of Science or Doctor of Philosophy degrees. Most employment requirements in technical fields, such as petroleum geology, now include not only advanced physics and chemistry but also mathematics through calculus. Employment opportunities are limited unless this requirement is met. Graduate students are expected to take some supporting courses in such allied fields as mining engineering, geophysics, and biology — depending on their major field of geologic studies.

A grade-point average of at least 3.0 (B) is required for an advanced degree in all courses in geology taken in the department while a graduate student. Scores in the general aptitude and geology tests of the Graduate Record Examination must be submitted. Each student must pass satisfactorily a comprehensive qualifying examination as an additional requirement before being admitted to candidacy for an advanced degree.

A thesis is required of all candidates for the Master of Science degree in geology. The thesis may be based on field work done while not in residence at the University by arrangement with the candidate's advisory committee. Final examinations on general geologic knowledge and the thesis subject must be passed.

Prospective students are urged to write the Chairman of the Department of Geology and Geography before making application to the Dean of Admissions and Records of the University for admission to Graduate School.

Doctor of Philosophy

In addition to the requirements above, the general requirements for the doctor's degree are set forth in Part 2 of this *Catalog*.

Research

Close cooperation between the West Virginia Geological and Economic Survey, located in Morgantown, and the Department of Geology makes a large amount of material available for laboratory investigation. This includes the fossil collections of the department and the survey. A large number of samples of drill cuttings from deep wells in West Virginia and adjoining states are housed in the survey. Morgantown is conveniently situated for detailed studies of Mississippian, Pennsylvanian, and Permian formations. Mineral products of the region near Morgantown include coal, petroleum, natural gas, and limestone. The occurrence and utilization of these materials can be studied by graduate students interested in economic geology. A permanent summer field camp (Camp Wood) is located in the Folded Appalachians at Alvon, Greenbrier County. The coastal geology program includes an annual trip to the Florida Keys, and three weeks on the shore of Virginia. Additional oceanography courses and research are available at the Marine Science Consortium at Wallops Island, Virginia, of which WVU is affiliated.

Geology

Geol.

201. *Physical Geology for Teachers*. I, II, S. 3 hr. PR: High school teaching certificate and consent. Composition and structure of earth and the geologic processes which shape its surface. Credit cannot be obtained for both Geol. 201 and Geol. 1 (or Geol. 5).
202. *Physical Geology Laboratory for Teachers*. I, II, S. 1 hr. Accompanies Geol. 201. Laboratory and field study of earth materials and features, and the topographic and geologic maps used to represent them. (\$10.00 lab fee.)
218. *Geology and the Earth Sciences*. I. 4 hr. PR: Geol. 151. Physical nature of the earth. Rotation, revolution, shape, and structure of the earth. Geologic forces changing the earth. Geologic history.
221. *Geomorphology*. I. 3 hr. PR: Geol. 1 or 5. An examination of the physical processes which shape the surface of the earth, with emphasis on fluvial processes and environmental geomorphology. Optional field trip at student's expense. (\$10.00 lab fee.)
222. *Geomorphology*. II. 3 hr. PR: Geol. 1 or 5. A consideration of glaciology and glacial geology as pertains to erosion and deposition by glaciers. The Pleistocene history of North America is stressed. Optional field trip at student's expense. (\$10.00 lab fee.)
228. *Photogeology*. II. 3 hr. PR: Geol. 127, 151, or consent. Instruction in basic and advanced techniques of air photo interpretation. (\$10.00 lab fee.)
231. *Invertebrate Paleontology*. I. 4 hr. PR: Geol. 3, 4, or consent. Invertebrate fossils: biologic classification, evolutionary development, ecology, and use in correlation of strata. (\$10.00 lab fee.)

235. *Introductory Paleobotany*. I, II. 4 hr. PR: Geol. 3. Resume of development of principal plant groups through the ages, present distribution, mode of occurrence and index species, methods of collection. Required Saturday field trips at student's expense. (\$10.00 lab fee.)
251. *Advanced Topics in Structural Geology*. II. 2-4 hr. PR: Geol. 151, or consent. Oral and written presentations by students and instructor on selected topics in descriptive, regional experimental, and theoretical structural geology.
261. *Stratigraphy and Sedimentation*. II. 3 hr. PR: Geol. 1 or consent. Study of sediments and sedimentary rocks. Field techniques stressed as data gathered and interpreted from rocks of Pennsylvanian age in Morgantown vicinity. Two-day field trip required. Basic field equipment and field trips at student's expense. (\$10.00 lab fee.)
266. *Appalachian Geology Field Camp*. S. 6 hr. PR: Geol. 151, 261. Practical experience in detailed geological field procedures and mapping. Living expense in addition to tuition must be paid at time of registration.
270. *Mineral Resources*. I. 3 hr. PR: Geol. 1, 184. Description, mode of occurrence, and principles governing the formation of ore deposits.
272. *Petroleum Geology*. II. 1-4 hr. PR: Geol. 151. Origin, geologic distribution, methods of exploration and exploitation, uses and future reserves of petroleum and natural gas in the world. (\$10.00 lab fee.)
290. *Geologic Problems*. I, II. 1-6 hr. (12 hr. max.). Special problems for seniors and graduates. (Sec. 10: Junior departmental honors students; Sec. 11: Senior departmental honors thesis.)
291. *Regional Geology Seminar*. I, II. 1-6 hr. (6 hr. max.) PR: Geol. 3, 151, 185, 261; or consent. Syntheses and descriptions of the regional geology of selected areas around the world, prepared and presented by the students.
294. *Introduction to Geochemistry*. II. 4 hr. PR: Chem. 16, Geol. 185, or consent. Basic review of physical and aqueous chemistry, discussion of the basic geochemical processes; calcium carbonate chemistry, diagenetic processes, weathering, the silicate and iron systems.
329. *Problems in Geomorphology*. I, II. 1-4 hr.
334. *Problems in Paleontology*. I, II. 1-4 hr.
336. *Advanced Paleobotany*. I, II. 4 hr. Continuation of Geol. 235.
339. *Problems in Paleobotany*. I, II. 1-4 hr.
340. *Advanced Stratigraphy*. II. 4 hr. PR: Geol. 231. Study of principles of rock and time correlation, and their application to the stratigraphy of West Virginia. Emphasis on carbonate rocks.
344. *Clay Geology*. I, II. 2-3 hr. PR: Geol. 185, 261, 369. Study of clay mineralogy with secondary emphasis on the origin and deposition of clay minerals in the stratigraphic record.
346. *Advanced Sedimentation*. I. 4 hr. PR: Geol. 185. Origin of sedimentary rocks; principles involved in interpretation of ancient geography, climates, animals, and plants. Emphasis on detrital sediments and rocks. Required field trips at student's expense.
348. *Problems in Sedimentation*. I, II. 1-4 hr.
349. *Problems in Stratigraphy*. I, II. 1-4 hr.
351. *Tectonic Elements*. II. 3 hr. PR: Geol. 151 or consent. Theories of large scale deformational processes operating within the earth's crust and upper mantle. Study of the regional structural geology of selected orogens.
359. *Problems in Structural Geology*. I, II. 1-4 hr.

362. *Sedimentology Field Camp*. S. 3-6 hr. PR: Geol. 261 or equiv. Field-lab course in experimental, modern, and ancient sedimentation. Living expenses in addition to tuition must be paid at time of registration. Field expenses extra.
363. *Ground-water Hydrology*. I. 3 hr. PR: Geol. 1 or consent. Study of the principles of ground-water hydrology; occurrence, development, uses, and conservation of ground-water.
369. *X-Ray Diffraction*. I, II. 3 hr. PR: Chem. 16 or consent. Theory of X-ray diffraction and application to the analysis of crystalline materials using the powder camera and X-ray diffractometer. Open to advanced students in geology, chemistry, engineering, and related fields, with consent of instructor.
371. *Economic Geology: Ore Deposits*. II. 3 hr. PR: Geol. 185. Mineral composition, geologic features, and distribution of deposits of principal useful metallic minerals.
372. *Economic Geology: Nonmetallics*. I. 3 hr. PR: Geol. 185. Occurrence, formation, and use of nonmetallic mineral substances, including building materials and chemicals.
374. *Problems in Economic Geology and Geochemistry*. I, II. 1-4 hr.
385. *Optical Mineralogy*. I. 4 hr. PR: Geol. 185 and one year of physics. Principles and practice in use of the petrographic microscope in identification of minerals. Emphasis on determination by immersion method.
386. *Petrology*. II. 4 hr. PR: Geol. 385. Composition, texture, occurrence, and origin of rocks. Study of hand specimens and thin sections.
388. *Problems in Mineralogy and Petrology*. I, II. 1-4 hr.
394. *Physical Geochemistry*. I. 3 hr. PR: Geol. 1, 184, 185, Chem. 16. Phase diagrams, metamorphic facies, origin of the elements, chemical properties of ions, crystal chemistry of minerals, element distributions and geochemical cycles.
395. *Aqueous Geochemistry*. I, II. 3 hr. PR: Geol. 1, Chem. 16 or consent. Review of basic chemical principles as they apply to aqueous geologic environments. Properties of water and the types, sources, and controls of the common and environmentally significant chemical species dissolved in water.
396. *Aqueous Geochemistry Lab*. II. 2 hr. PR: Geol. 395 previous or concurrent. Laboratory and field methods for geochemical water analysis, significance of natural and polluted waters is emphasized. Several field trips are required to area streams.
399. *Quantitative Methods in Geo-Sciences*. II. 4 hr. PR: Stat. 101, 201, and 202 or 311, 312, and consent. Brief review and introduction to specific quantitative techniques as applied to geology and geography.
420. *Advanced Topics*. I, II. 1-12 hr. Includes separate courses in basin structures, geophysics, karst, advanced hydrology, instrumentation, carbonates, paleoecology, regional geology, environmental geoscience, paleogeography.
432. *Micropaleontology*. I. 4 hr. PR: Geol. 231. Identification of Foraminifera and Ostracoda; emphasis on classification, nomenclature, and use of paleontological literature.
487. *Advanced Petrology*. I. 3 hr. PR: Geol. 386. Study of the composition, classification, and origin of igneous and metamorphic rocks. Laboratory work consists of a study of crystalline rocks by microscopical methods.
497. *Research*. I, II. 1-15 hr.

Geography

Geogr.

- 202. *Political Geography*. I. 3 hr. PR: Consent. Examination of spatial interrelationship of man and his environment in a political setting; population developmental and boundary problems.
- 203. *Historical Geography of Anglo-America*. II. 3 hr. Exploration, settlements, and changing patterns of human occupancy from the sixteenth century to the present; cultural areas and their significance.
- 210. *Urban Geography*. II. 3 hr. Location, development, and change of urban land use patterns, urban spatial structures and contemporary urban problems.
- 219. *Problems in Geography*. I, II. 1-6 hr. per sem. PR: Consent. Independent research.
- 220. *Seminar in Geography*. I, II. 1 to 6 hr. per sem.; max. 15 hr. Includes separate seminars in urban, economic, population, physical, medical, behavioral, quantitative, Appalachian, transportation, environmental, settlement, education, census, planning, cultural, resource, agricultural, and geographic model building.
- 240. *Geography of U.S.S.R. and Eastern Europe*. II. 3 hr. Analysis of the physical environment, human resources, and economic utilization of the region.
- 246. *Geography of Africa*. II. 3 hr. Systematic and regional characteristics and geographic problems of political, social and economic development.
- 261. *Cartography*. I. 3 hr. Theory and practice of map design.

HISTORY

Master of Arts

Candidates for admission to the master's degree program in history should have had 18 hours of upper-division undergraduate work in history and 9 hours of upper-division undergraduate work in some closely related subject, preferably economics, political science, or sociology and anthropology. A reading knowledge of one foreign language is desirable. Candidates should have a minimum 2.5 overall average in the undergraduate program and a minimum 3.0 overall average in their majors or minors in history.

The Department of History requires that all candidates for the Master of Arts degree in history present an overall average of 3.0 (B) for all graduate courses taken; it will not accept toward an advanced degree credits in courses offered by the Department of History which are reported with a grade lower than B.

There are two routes to the master of arts degree in history: a 36-hour degree and a 30-hour degree. The 36-hour degree includes a minimum of 24 semester hours in history, 6 of which shall consist of courses of the 300-400 seminar series. It is possible to include in the 36-hour program a minimum of 9 to 12 hours in one minor representing a closely related discipline in the College of Arts and Sciences. It also is possible that all 36 hours be in the Department of History. The candidate for the 36-hour master's will be required to pass a final oral comprehensive examination covering the candidate's graduate coursework.

The 30-hour degree consists of 24 hours of coursework in history and incorporates a thesis for which 6 hours credit may be allowed. The candidate for the 30-hour master's will be required to pass a final oral comprehensive examination covering the graduate coursework and the thesis.

Doctor of Philosophy

Requirements for the Ph.D. degree in history include the general requirements of the Graduate School; a reading knowledge of a second foreign language approved by the Department; passing the Ph.D. comprehensive examination of two parts (oral and written) administered by a committee of faculty members (normally at the end of a full-time student's second year of study); preparation of an acceptable dissertation based upon original investigation; and successful defense of the dissertation in a final examination.

A candidate must offer a program of study in four fields, at least three of which must be in history; the other may be in a related field approved by the department. The Department of History requires that all candidates for the doctor's degree present an overall average of 3.0 (B) for all graduate courses taken; it will not accept toward an advanced degree credits in courses offered by the Department of History which are reported with a grade lower than B. The fields must be selected from the following:

- | | |
|-----------------------------------|---------------------------------|
| 1. History of the U.S. to 1865 | 6. Europe, 1789-present |
| 2. History of the U.S. Since 1850 | 7. History of England |
| 3. Medieval History | 8. History of Asia and Africa |
| 4. Renaissance and Reformation | 9. Latin America |
| 5. Europe, 1500-1815 | 10. Field in another department |

History

Hist.

201. *Social and Economic History of the Middle Ages, 300-1000*. 3 hr. Topics include the social-economic crisis of the late Roman and German institutions, the Merovigian and Caroligian economics, Pirenne Thesis, and transition to feudal society. Hist. 103 recommended as preparation.
202. *Social and Economic History of the Middle Ages, 1000-1500*. 3 hr. Topics include feudal society, land and population expansion, fairs, town, leagues, Italian leadership, crusades, church influence, black death, fourteenth century revolts, and general decline of late Middle Ages. Hist. 103, 201 recommended as preparation.
205. *The Renaissance*. 3 hr. Survey of the underlying political, economic, and social structure of fourteenth and fifteenth century Italy with concentration on the significant intellectual and cultural trends which characterized the age. Some consideration given to the problem of the impact of the early Reformation movement upon Renaissance culture.
206. *The Reformation*. 3 hr. The distinguishing theological characteristics of the major Reformation movements with concentration on the effect of religious-intellectual crisis on the political and social structure of the sixteenth century.
209. *The ABC Powers of Latin America*. 3 hr. Detailed course of the political events and of the economic and cultural institutions of Argentina, Brazil, and Chile from the dawn of independence to the present day.
210. *Modern Spain*. 3 hr. Survey of Spanish political, economic, and cultural developments from national unification under Ferdinand and Isabella to Francisco Franco. Includes Portuguese history from 1580 to 1640.
213. *Bourbon France*. 3 hr. French history from the reign of Henry IV to the reign of Louis XVI. Special attention given to the reigns of Louis XIII and Louis XIV. Political, cultural, and intellectual history emphasized.

214. *The Revolutionary-Napoleonic Era*. 3 hr. French history from mid-eighteenth century to 1815. Special attention given to the background of the French Revolution of 1789, to the political and social history of the revolution, and to Napoleon's non-military achievements.
215. *European Diplomatic History, 1815 to 1919*. 3 hr. Designed to develop an understanding of the forces, men, and events which determined diplomatic relations between the major powers.
216. *European Diplomatic History, 1919 to Present*. 3 hr. Scope similar to that of Hist. 216.
217. *Diplomatic History of the U.S.S.R., 1917 to 1939*. 3 hr. Detailed study of Soviet diplomatic history, with emphasis on the view from the Kremlin balanced by the responses of other powers. An understanding of European diplomatic history is desirable.
218. *Diplomatic History of the U.S.S.R., 1939 to Present*. 3 hr. Scope similar to that of Hist. 217.
222. *Twentieth-Century Germany from Weimar to Bonn*. 3 hr. The Weimar Republic, the Third Reich, and the two German states created after World War II.
225. *History of Modern China*. 3 hr. Introduction to modern China (since 1839) with some attention to China's Confucian heritage; examines in detail the Chinese effort to modernize in the face of Western diplomatic and economic pressure; specific attention to China's Nationalist and Communist revolutionary traditions.
226. *History of Modern Japan*. 3 hr. Introduction to modern Japan (since 1868) with some attention to the development of Japanese institutions and ideas in earlier periods, especially the Tokugawa Era (1600-1868); examines the rapid pace of economic change in the nineteenth and twentieth centuries along with the important social, political, and diplomatic implications of this change.
229. *History of Africa: Pre-Colonial*. 3 hr. History of Africa from earliest man to the middle of the nineteenth century. Particular emphasis on population movement and interaction, state formation, and the development of trade in sub-saharan Africa as well as the impact of such external influences as Christianity and Islam.
230. *History of Africa: European Dominance to Independence*. 3 hr. History of Africa from the middle of the nineteenth century to the 1960's. In the first half of the course, the establishment and functioning of European colonial regimes in African history, and recent interpretations in the field.
231. *Seventeenth Century Britain, 1603-1715*. 3 hr. The more significant political, social, economic, religious, and intellectual developments of Britain during a century of revolution and of the men and women who interacted with those movements.
232. *Eighteenth Century Britain, 1715-1832*. 3 hr. The "Age of Aristocracy," the political, social, religious, economic, and intellectual forces which produced it, and the reasons for its decline under the combined impact of the Industrial, Agricultural, American, and French revolutions.
241. *English Social History, Fourteenth to Eighteenth Century*. 3 hr. Topical examination of English society from the time of Chaucer to Milton. Major topics: society in town and country, economy, politics, religion, and thought.
242. *English Social History, Eighteenth Century to the Present*. 3 hr. Topical examination of English society from the time of Queen Anne to the present.
251. *History of Black People in America to 1900*. 3 hr. Consideration given to slave trade and evolution of slavery in the New World, the attack upon slavery and its destruction, the South and the Negro during Reconstruction, and the age of Reaction and Racism, 1875-1900.

252. *History of Black People in America Since 1900.* 3 hr. Consideration given to race conflict and black migration, the blacks in American world wars, desegregation practices both in the South and the North, and trends toward black nationalism.
253. *Civil War and Reconstruction.* 3 hr. Study of the causes as well as the constitutional and diplomatic aspects of the Civil War; the role of the American Negro in slavery, in war, and in freedom; and the economic and political aspects of Congressional Reconstruction.
255. *The Cleveland Era.* 3 hr. An examination of national history during the "Gilded Age," with emphasis on the political and social impacts of urban-industrial growth. Topics include the growth of large cities and a national communications network, the rise of the corporation, the subordination of regional interests and racial minorities, political protest movements and changes in the structure and sociology of politics, with special attention to the Congress and the Presidency.
257. *The United States From McKinley to the New Deal, 1896 to 1933.* 3 hr. Detailed study of American national history from William McKinley to Franklin D. Roosevelt. Particular attention given to the great changes in American life after 1896; national political, economic, social, and cultural development; the Progressive Era in American politics; and alterations in American foreign relations resulting from the Spanish-American War and World War I.
259. *Recent American History, 1933 to Present.* 3 hr. Detailed study of American national history from the inauguration of Franklin D. Roosevelt to the present. Emphasis on the New Deal; on Roosevelt's foreign policies and their impact on American social, technological, and cultural developments; and on United States domestic problems and foreign relations since 1945.
261. *Economic and Social Development of West Virginia.* 3 hr. Study, primarily regional in nature, of the economic, social, technological, cultural, and religious history of West Virginia.
263. *American Diplomacy to 1918.* 3 hr. American foreign policy and diplomacy from the adoption of the Constitution to the end of World War I. Assumes some student knowledge of the period such as that obtained in Hist. 52 and 53.
264. *American Foreign Policy and Diplomacy, 1918 to the Present.* 3 hr. America's foreign policy and growing involvement in international relations including our role in World War II, the Korean War, and Vietnam. Assumes that the student has some knowledge of the period such as that obtained in Hist. 3, 53, or 161.
266. *American Economic History to 1865.* 3 hr. Covers the origins and development of American business, agricultural, and labor institutions, problems, and policies, from 1600 to 1865; and studies the influence of economic factors upon American history during this period.
267. *American Economic History Since 1865.* 3 hr. Covers 1865 to the present. Scope similar to that stated for Hist. 266.
268. *The Old South.* 3 hr. Examination of the history of one section of the United States — the South — exploring the peculiar differences that led to an attempt to establish a separate nation. The geographical limitation permits a detailed study of economic and social forces within the context of the larger national history. For advanced undergraduates and graduates.
269. *The New South.* 3 hr. Study of the integration of the South into the nation after the Civil War. Emphasis upon southern attitudes toward industrialization, commercial agriculture, organized labor, and the Negro. Special attention given to the southern literary renaissance and conservative and progressive politics of the southern people.

271. *The American Frontier East of the Mississippi*. 3 hr. Detailed course of westward expansion from the discovery of America to the Louisiana Purchase. Emphasis on frontier section in the region from the Tidewater to the Mississippi Valley.
272. *The American Frontier West of the Mississippi*. 3 hr. Continuation of westward expansion from the Louisiana Purchase to the passing of the frontier in 1893. Original investigation and reassessment of a number of controversial problems.
273. *The City in American History*. I. 3 hr. The Era of Commerce, 1630-1895: concerning the settlement, design, and growth of North American commercial and administrative centers particularly transportation development and the role of urban elites in shaping national economic policies.
274. *The City in American History*. II. 3 hr. The Industrial Age, 1820-present: focusing on the interaction of industrialization and urbanization during the nineteenth and twentieth centuries particularly the impact of technology upon urban life and the role of cities in national politics.
301. *Readings in Medieval History*. 3-6 hr. Crusades and intellectual history are the focus. Readings in preparation for medieval field may be selected by graduates. Hist. 103 urged strongly for undergraduates; also reading knowledge of Latin, French or German recommended for all.
305. *Readings in English History*. 3-6 hr. Directed readings of scholarly books and articles, primarily in the history of England from about 1450 to about 1625 but with some opportunity for the student to fill gaps in his knowledge of other periods of English history.
309. *Readings in Central European History*. 3-6 hr. All students will read and discuss selected works illustrating outstanding scholarship or interpretative problems related to fifteenth, sixteenth, and early seventeenth century history. In addition opportunity will be provided for each student to pursue an independent reading project tailored to his special interests.
313. *Readings in Eastern European History*. 3-6 hr. For the student who desires to read on a specific topic in Russia or Soviet history. Materials selected will be primarily in the most scholarly studies available in English.
317. *Readings in Western European History*. 3-6 hr. This course, primarily for graduate students and selected undergraduates, is designed for an intensive reading program on special problems in western European history.
321. *Readings in Asian History*. 3-6 hr. Intensive readings in the history of East Asia (especially China and Japan) since the nineteenth century; students should normally have had Hist. 225 and 226 or their equivalents; reviews as well as bibliographical and historiographical essays required.
325. *Readings in African History*. 3-6 hr. This course will normally focus on readings and discussion on problems in the history of pre-colonial Africa, the major works in African history, and recent interpretations in the field.
351. *Readings in American History, 1492-1789*. 3-6 hr. A course of supervised readings and reports designed to prepare students for intensive study in a seminar or for field examinations in the colonial period of American history. Students are expected to acquire comprehensive and detailed bibliographical knowledge.
355. *Readings in American History, 1763-1865*. 3-6 hr. A course of supervised reading and reports designed to prepare students for intensive study in a seminar or for field examinations in the early national period. Students are expected to acquire comprehensive and detailed bibliographical knowledge.
359. *Readings in American History, 1850-1898*. 3-6 hr. A survey of the narrative and interpretative literature of the Civil War, Reconstruction, and the Gilded Age. Students will be expected to make weekly or bi-weekly reports on assigned read-

ings and also to prepare a critical essay on some aspect of American historiography for this period.

363. *Readings in American History, 1898 to Present.* 3-6 hr. Reading and class-led discussion of one paper-back book per week, and preparation of a paper based on these books and the class discussion of them. Usually concentrates on post World War II foreign relations.
367. *Readings in Frontier History.* 3-6 hr. A detailed course of reading of sources and significant secondary works in frontier literature.
373. *Readings in Local and Regional History.* 3-6 hr. A course for graduate students and seniors in the history of West Virginia and neighboring states, which form what is known as the Trans-Allegheny or Upper Ohio region.
377. *European Cultural and Intellectual History. (300-1000 A.D.)* 3 hr. Topical approach including the development of early Christian thought, the conflict of pagan and Christian thought, the Latin Church Fathers, Boethius, Irish & Anglo-Saxon culture, the Carolingian Renaissance. Hist. 103 recommended, as well as reading knowledge of Latin, French, or German.
378. *European Cultural and Intellectual History. (1000-1500).* 3 hr. Topics include Cathedral Schools, Renaissance of 12th century, Arab influence on Western thought, Scholasticism, post-Thomistic reaction, and developing political theory. Hist. 103, 301 plus reading knowledge of Latin, French, German or Italian are all recommended.
381. *Intellectual and Social History of the United States to 1876.* 3 hr. The objective of the course is to establish for graduate students usable frames of reference for intellectual and social history. The basic premises of various historians are examined as they have been applied to the history of the United States before 1876.
382. *Intellectual and Social History of the United States Since 1876.* 3 hr. A continuation of Hist. 381, with the same objective of establishing usable frames of reference for intellectual and social history, with the focus on the history of the United States since 1876. Special attention is devoted to the problems of very recent or contemporary history.
391. *The American Labor Movement.* 3 hr. A readings course which emphasizes the various labor unions and labor's political activities in the United States from the eighteenth century to 1960. Careful attention is given to the economic and social conditions that have shaped the history of labor in this country. The course treats the story of American labor as an integral part of the history of the United States.
392. *History of American Agriculture.* 3 hr. A readings course to acquaint students with the origins and evolution of American agriculture, with particular emphasis upon scientific, technological, and economic development; to familiarize them with some public and private agricultural organizations; and to give them a historical understanding of contemporary agricultural problems and policies.
402. *Seminar in Medieval History.* 3 hr. Crusades and intellectual history of Europe in the Middle Ages with emphasis on the period from 1000 to 1300. Prerequisites: History 301 and reading knowledge of Latin plus French or German or Italian.
406. *Seminar in English History.* 3 hr. Directed research in selected topics in the history of England from about 1450 to about 1625. Training in bibliography, research methods, and paleography.
410. *Seminar in Central European History.* 3 hr. An intensive survey of the bibliographical aids and printed source materials available in the field of Reformation history. A research paper and a bibliographical essay will be presented by each student. Reading knowledge of German and French strongly recommended.

414. *Seminar in Eastern European History*. 3 hr. Selected topics in nineteenth or twentieth century Russian/Soviet diplomatic or political history. Research paper required.
418. *Seminar in Western European History*. 3 hr. A research seminar in selected topics in western European history. Requirements: examinations, problem papers, research papers, and extensive reading. A reading knowledge of the appropriate languages also is required.
422. *Seminar in Asian History*. 3 hr. Advanced readings and research in East Asian history; specific emphasis on research tools and techniques; research paper based on English-language sources required; students should normally have had Hist. 225 and 226 or their equivalents.
426. *Seminar in African History*. 3 hr. The seminar will normally focus on Eastern Africa in the colonial period. Location and use of source materials will be emphasized as well as economic and political developments. Students will spend considerable time in research and writing on selected aspects of Eastern African history.
452. *Seminar in American History, 1492-1789*. 3 hr. Students work together and with the instructor on the historical materials of the era, confronting the problems and learning the techniques for using different kinds of original materials. Periodic progress reports are required at each meeting and one major paper, derived primarily from the original materials being used.
456. *Seminar in American History, 1763-1865*. 3 hr. Students work together and with the instructor on historical materials of the era, confronting the problems and learning the techniques for using different kinds of original materials. Periodic progress reports required at each meeting and one major paper, derived primarily from the original materials being used.
460. *Seminar in American History, 1850-1898*. 3 hr. Directed research in recent American history including guidance in method of research and manuscript preparation.
464. *Seminar in American History, 1898 to Present*. 3 hr. Directed research in recent American history including guidance in method of research and manuscript preparation.
468. *Seminar in Frontier History*. 3 hr. Intensive study of selected frontier problems. Requirements: detailed outside reading and a term paper on some original topic based on sources and secondary works.
474. *Seminar in Local and Regional History*. 3 hr. A seminar for graduate students in the history of West Virginia and neighboring states, which form what is known as the Trans-Allegheny or Upper Ohio region.
477. *American Historiography*. 3 hr. A review of the major American historians and biographers and their interpretative studies. The nationalism, imperial, frontier, sectional, social and intellectual schools of history are studied as well as those historians who have concerned themselves with the problems of writing history.
478. *European Historiography*. 3 hr. Readings of selected works representative of each of the following historical periods: Ancient, Medieval, Renaissance-Reformation, Early Modern, and Modern. Reports required with attention to style, purpose, philosophy, and methodology of the historians selected. Attention to trends, major breakthroughs, and classics in the writing of European history. Reading knowledge of Greek, Latin, French, German, or Italian an asset.
- 481, 482. *Special Problems*. 1-3 hr. ea.
490. *Teaching Practicum*. 1-3 hr. per sem. PR: Consent. Supervised practice in the college teaching of history.
497. *Research*. 1-15 hr.

PROGRAM FOR THE HUMANITIES

The following courses are offered during the summer only according to demand. They are primarily intended for students of art, humanities, literature, and related fields.

Humanities

- 250. *Culture Tour of Europe*. S. 6 hr. PR: Some cultural background in European civilization such as Humanities 1, 2, Hist. 1, 2, 3, art survey courses, or equiv., or consent.
- 260. *Culture Tour of Latin America*. S. 6 hr. PR: Some cultural or historical background in Latin America, such as history or art courses, or consent.
- 270. *Cradle of History Tour of the Near East*. S. 6 hr. PR: Humanities 1, 2, Hist. 1, 2, 3, or equiv. or consent.
- 280. *Around-the-World Culture Tour*. S. 6 hr. PR: Course in world or western civilization, such as Humanities 1, 2, Hist. 1, 2, 3, or consent.

LIBRARY SCIENCE

The Department of Library Science offers a graduate program which culminates a Master of Arts degree in Education with a field in Library Science. This degree is granted in conjunction with the College of Human Resources and Education and the Graduate School.

The courses are designed for:

1. Elementary or secondary school teachers who wish to meet the certification requirements for school librarians in West Virginia and other states.
2. School librarians who plan to develop professionally.
3. Teachers and school librarians in need of in-service training.
4. Administrators who wish to broaden their knowledge and training in the field of school library media.

Students will be admitted to the graduate program when they have met the following departmental requirements:

1. A Bachelor's degree from an approved college or university with the evidence of 3 semester hours credit in Lib. Sci. 201 (Basic Reference) or equivalent.
2. A broad cultural background, with a field of specialization, and Teacher Certification in Elementary or Secondary Education.
3. Evidence of ability to undertake the completion of the Library Science program as well as promise of professional proficiency as shown by previous academic record.
4. A personal interview whenever possible.

Degree Requirements: The candidate for the Master of Arts in Education degree with a field in Library Science will be required to complete 30 semester hours of graduate study consisting of:

- (1) a. Eighteen graduate hours in Library Science, with an average of B, of which at least 3 hours will be in courses of 400 series; or
b. Twelve graduate hours in Library Science with an average of B, of which at least 3 hours will be courses of 400 series, and 6 graduate hours in a related field (with faculty adviser approval) with an average of B.
- (2) a. Nine hours graduate courses in Education with an average of B, Audio-Visual Resources and Introduction to Education Research, and 3-6 hours of electives.
b. A 3-hour problem report (Lib. Sci. 411 or C&I 319) in some phase of

librarianship; thus completing the 30 semester hours necessary for the degree.
c. A written comprehensive examination.

Required Courses in Education	9 hr.
Ed. Psych. 260—Audio-Visual Resources in Education	3
Ed. Psych. 320—Introduction to Education Research.....	3
C&I 391—Problem in Education (Library Science).....	3
Electives from this group	3-6 hr.
Ed. Psych. 330—Educational Measurements.....	3
Ed. Psych. 362—Organizing Programs of Audio-Visual Instruction	2
Ed. Found. 320—Philosophy of Education	3
C&I 301—Elementary School Curriculum.....	3
C&I 304—Secondary School Curriculum	3
Ed. Adm. 300—Public-school Organization and Administration.....	3
Ed. Psych. 440—Human Development and Behavior	3
Ed. Found. 340—History of Education	3
C&G 303—Basic Course in Guidance	3

Library Science

Lib. Sci.

- 201.* *Reference and Bibliography*. I, S. 3 hr. PR: Consent. Basic reference books, dictionaries, encyclopedias, indexes, yearbooks, and other reference materials are studied and evaluated, with emphasis on the theory of and practical experience with reference books. Required for Library Science majors.
- 203.* *Library Materials for Children*. I, II, S. 3 hr. Survey of children's literature in the light of historical development, with emphasis on current trends. Consideration of the criteria for and means of evaluating print and nonprint materials for support of the curriculum, recreation, and child guidance.
- 205.* *Selection of Books and Related Materials for the Secondary School Library*. I, II, S. 3 hr. Survey of adolescent literature and other library materials adapted to the needs of junior and high school students.
- 207.* *Organization and Administration of the Instructional Materials Center in the Secondary School*. I, S. 3 hr. PR: Lib. Sci. 205, 223, for school librarians. Study of organization and administration, including planning, equipment, routines, and schedules, and the role of the librarian in the instructional program.
- 222.* *Field Practice*. I, II, S. 3 hr. PR: Lib. Sci. 201, 203, 205, 207, 223, or 235. Practical experience in a variety of public, school, and special libraries, and instructional materials centers, under the supervision of experienced librarians and media specialists. Student must complete 100 clock hours.
- 223.* *Cataloging and Classification*. II, S. 3 hr. Basic principles and problems of cataloging and classification combined with practical experience in processing the various types of books and materials. Problems peculiar to the teacher-librarian considered.
224. *History of Books and Libraries*. I, S. 3 hr. Survey course, including the development of the book from early manuscript form, history of printing, printers, book illustration, bindings, and the library and its development.
- 235.* *Organization and Administration of the Instructional Materials Center in the Elementary School*. II, S. 3 hr. PR: Lib. Sci. 223. For school librarians. Includes planning quarters; selection, acquisition, and organization of books and other materials; supervision of library assistants; and relations with faculty, administration, and community.

*Presently required for Certification in West Virginia.

326. *Literature of the Social Sciences*. I, S. 3 hr. PR: Consent. Bibliographic and reference sources in the social sciences. Course designed to give the student a good working knowledge of the major sources of information in the social sciences and the ability to make effective use of the library.
327. *Literature of the Humanities*. I, S. 3 hr. Bibliographic and other reference sources in the major subject areas of the humanities, including religion, philosophy, fine arts, music, and literature.
328. *Literature of Science and Technology*. II, S. 3 hr. PR: Consent. Designed to give the student a good working knowledge of the increasingly complex literature of science and technology.
330. *Library Resources for the School Curriculum*. II, S. 3 hr. Library and community resources, print and non-print, for curriculum enrichment. Presented to elementary and secondary teachers and to librarians to help them give more effective services.
409. *Seminar*. I or II, S. 3 hr.
410. *Special Topics*. 3 hr. A thorough study of some phase of library science based on the needs and interest of the individual.
411. *Problem Report*. 3 hr. PR: 9 hr. of Education courses.

MATHEMATICS

The Department of Mathematics offers the Master of Arts and the Master of Science degrees.

Students who expect to work for the Master of Arts degree must have completed the equivalent of the mathematics requirements of an undergraduate major at WVU.

The Master of Science degree is designed for students who are or who plan to become secondary teachers. Students who expect to work for the Master of Science degree must have completed the equivalent of the requirements for the comprehensive teaching field in mathematics at WVU.

Deficiencies may be removed by the student who wishes to pursue either degree by the satisfactory completion of recommended undergraduate courses. It also is possible to establish this competency by examination. No coursework required for the removal of deficiencies may be included in the program for the graduate degree.

Each student has the responsibility to become familiar with the requirements of the Graduate School, particularly with respect to deadlines for applying for degree-completing examinations, and with the details of the degree requirements of the Department of Mathematics.

Students are expected to maintain at least a 3.0 (B) average in their mathematics courses and to present at least a 3.0 average in all work offered in fulfillment of the degree requirements.

Candidates for the Master of Arts degree must complete a minimum of 30 semester hours of graduate course work. Normally this will include at least 6 hours in each of the three fields: algebra, analysis, and topology. For certain special programs, especially those where work in other departments is to be included, the Department Graduate Advisory Committee may adjust the requirements to provide a more coherent program. Up to 6 hours of credit may be earned by a student who elects to write a thesis. Proficiency in one foreign language must be established before the final semester in which the degree requirements are met; however, this requirement may be waived by the Department Graduate Advisory Committee in the event that other knowledge would provide more relevant support for the particular program.

Candidates for the Master of Science degree must complete a minimum of 33 semester hours of which at least 18 must be in the 300 series in the Department of Mathematics. The total program which may include courses in mathematics education and mathematics related courses in other departments must be established and approved by the Department Graduate Advisory Committee.

A final examination (comprehensive in nature) is required for both degrees.

For a more complete statement of departmental requirements, the student is referred to the department's *Handbook for Graduate Students in Mathematics*.

Mathematics

Math.

213. *Partial Differential Equations*. II. 3 hr. PR: Math. 113 or consent. Introduces students in mathematics, engineering, and the sciences to methods of applied mathematics. First and second order equations, canonical forms, wave, heat and Laplace's equations, representation of solutions.
214. *Vector Analysis*. I, II. 3 hr. PR: Math. 18. Primarily for engineers and scientists. Vector algebra, differential operators, curvilinear coordinate systems, Stokes' and Gauss' theorems, applications, linear systems of equations, matrices, determinants, quadratic forms, eigenvalues and canonical forms, and numerical inversions.
215. *Applied Modern Algebra*. II. 3 hr. PR: Consent. Introduction to graph theory. Boolean algebras, monoids, finite-state and Turing machines with applications to computer design, algebraic coding theory and computer language, especially ALGOL.
219. *Seminar in Applied Mathematics*. I, II. 1-12 hr.
223. *Applied Matrix Algebra*. I. 3 hr. PR: Math. 18 or 51. Matrix and vector space review, theory and computer computation of characteristic roots and vectors, theory and computation of generalized inverses and other methods of solving systems of linear equations, orthogonal and other special matrices, patterned matrices, applications in statistics. (Equiv. to Stat. 223, C.S. 223.)
226. *Mathematical Statistics*. II. 3 hr. PR: Math. 18 or 51. Discrete and continuous variables, correlation, regression, sampling theory, normal, chi-square, t, and F distributions; significance tests; analysis of variance.
- 231, 232. *Introduction to Mathematics for the Elementary Teacher*. I, II. 3 hr. per sem. PR: Math. 34 or consent. Not open to students who have credit for Math. 131, 132. Course is designed especially for inservice elementary mathematics teachers. Systems of numeration; sets, relations, binary operations, decimal and other base systems; natural numbers, integers, rational numbers, and real numbers with emphasis on the algebraic structure of each; the notions of length, area, and volume; Pythagorean theorem; and coordinate geometry.
239. *Elementary Number Theory*. II. S. 3 hr. PR: Math. 16 or Math. 131 or consent. A study of divisibility, congruences, linear and quadratic diophantine equations, number theoretic functions, and applications of number theory to other areas of mathematics.
241. *Introduction to Linear Algebra*. I, II. 3 hr. PR: Math. 163 or consent. A study of vector spaces, subspaces, quotient spaces, direct sums, linear transformations, fundamental isomorphism theorems, matrix representations, dual spaces, canonical forms. Multilinear algebra (i.e. bi-linear functions, determinants).
- 251, 252. *Introduction to Real Analysis*. I, II. 3 hr. per sem. PR: Math. 163 or consent. A study of sequences, convergence, limits, continuity, definite integral, the derivative, differentials, functional dependence, multiple integrals, sequences and series of functions.

255. *Advanced Real Calculus*. S. 3 hr. PR: Math. 51 or consent. Limits, series, metric spaces, uniformity, integrals.
256. *Complex Variables*. II. 3 hr. PR: Math. 18 or 51. Complex numbers, functions of a complex variable; analytic functions; the logarithm and related functions; power series; Laurent series and residues; conformal mapping and applications.
261. *Mathematical Logic II*. II. 3 hr. PR: Phil. 106 or Math. 161 or consent. A more formal and rigorous approach to the material covered in Phil. 106; selected problems in the philosophy of mathematics and the philosophy of logic. (Equiv. to Phil. 206.)
263. *Pro-Seminar*. I, II, S. 3 hr. PR: Consent. An introduction to the foundations of mathematics via axiomatic set theory and cardinal and ordinal numbers, with emphasis on applications to other parts of mathematics.
265. *Introduction to Metamathematics I*. I. 3 hr. PR: Consent. Survey of the methodology of the deductive sciences with emphasis on the theory of proof and effective operations therein.
266. *Introduction to Metamathematics II*. II. 3 hr. PR: Math. 265. Course deals with recursive function theory. Godel's proof and associated results.
269. *Advanced Topics in Mathematics*. I, II, S. 3-9 hr. PR: Consent. An independent but directed study program, the content of which is to be mutually agreed upon by the individual student and instructor.
271. *Projective Geometry*. II. 3 hr. PR: Math. 141, 241, or consent. Projective and affine spaces, transformation groups for planes. Introduction to axiomatic plane geometries.
- 291, 292. *Theory of Probability*. I, II. 3 hr. per sem. PR: Math. 18 or 51. Fundamental theorems. Development of density and distribution functions in the discrete and continuous cases. Classical problems and solutions. Moments, characteristics functions, limit theorems. Applications.
- 301, 302. *Combinatorial Analysis*. I, II. 3 hr. per sem. PR: One year of calculus. Permutations, combinations, generating functions, principle of inclusion and exclusion, distributions, partitions, compositions, trees and networks.
- 305, 306. *Theory of Numbers*. I, II. 3 hr. PR: One year of calculus. Introduction to classical number theory, covering such topics as divisibility, the Euclidean algorithm, Diophantine equations, congruences, primitive roots, quadratic residues, number-theoretic functions, distribution of primes, irrationals, and combinatorial methods. Special numbers, such as those of Bernoulli, Euler, and Stirling.
313. *Intermediate Differential Equations*. II. 3 hr. PR: Math. 241, 252. A rigorous study of ordinary differential equations including linear and non-linear systems, self-adjoint eigenvalue problems, non-self-adjoint boundary-value problems, perturbation theory of autonomous systems, Poincare-Bendixson theorem.
314. *Tensor Analysis*. II. 3 hr. PR: Math. 214, 252 (or 318). Inner product vector spaces, bilinear forms, tensors as multilinear forms, geodesic differentiation, theory of curvature of general manifolds.
315. *Operational Methods in Partial Differential Equations*. II. 3 hr. PR: Math. 113, 252, (or 318). Laplace transformation, properties and elementary applications; problems in partial differential equations; complex variable; problems in heat conduction, mechanical vibration, etc. Sturm-Liouville systems. Fourier transforms.
- 317, 318. *Advanced Calculus*. I, II. 3 hr. per sem. PR: Math. 18. Primarily for engineers and scientists. Functions of several variables, partial differentiation, implicit functions, transformations; line, surface and volume integrals; point set theory, continuity, integration, infinite series and convergence, power series, and improper integrals.
319. *Seminar in Applied Mathematics*. 1-12 hr.

- 321, 322. *Introduction to Numerical Analysis*. I, II. 3 hr. per sem. PR: Math. 51 and Math. 241 or Math. 214 or consent. Approximation of functions, iteration procedures, numerical integration and differentiation, numerical solution of linear and nonlinear equations, and ordinary differential equations, error analysis and pitfalls of computation.
- 333, 334. *Foundations of Algebra*. S. 2 hr. per sem. PR: Differential and integral calculus, or consent. Not open to students with credit for Math. 236. Introduction to algebraic structures: rings, the integral domain of integers, properties of the integers, fields, polynomials over a field, groups; matrices; linear systems; vector spaces; vector geometry; linear transformation; and linear programming. This course is designed especially for prospective high school mathematics teachers. Other students may be admitted with departmental approval obtained prior to registration.
- 335, 336. *Foundations of Geometry*. S. 2 hr. PR: Differential and integral calculus, or consent. A study of affine, projective, Euclidean, and non-Euclidean geometries. This course is designed especially for prospective high school mathematics teachers. Other students may be admitted with departmental approval obtained prior to registration.
- 337, 338. *Probability and Statistics*. S. 2 hr. per sem. PR: Differential and integral calculus or consent. Finite sample space, measure of the set of outcomes and probability of events, independent trials, functions on the sample space, approximations to the binomial distribution, elementary statistical inference, continuous sample space, limit theorems, stochastic processes, statistical models, and applications. This course is designed especially for prospective high school mathematics teachers. Other students may be admitted with departmental approval obtained prior to registration.
339. *Special Topics*. I, II, S. 1-12 hr.
- 341, 342. *Modern Algebra*. I, II. 3 hr. per sem. PR: Math. 141, or consent. Concepts from set theory and the equivalence of the Axiom of Choice. Zorn's Lemma and the Well-Ordering Theorem; a study of the structure of groups, rings, fields, and vector spaces; elementary factorization theory; extensions of ring and fields; modules and ideals; and lattices.
343. *Linear Algebra*. II. 3 hr. PR: Math. 241 or consent. Review of theory of groups and fields; linear vector spaces including the theory of duality; full linear group; bilinear and quadratic forms; and theory of isotropic and totally isotropic spaces.
349. *Automata Theory*. 3 hr. The mathematical aspects of information processing, including devices, languages and structure of general systems.
- 351, 352. *Theory of Functions of Real Variables*. I, II. 3 hr. per sem. PR: Math. 181, 252. A development of the Lebesgue integral, function spaces and Banach spaces, differentiation, complex measures, the Lebesgue-Radon-Nikodym theorem.
- 355, 356. *Theory of Functions of Complex Variables*. I, II. 3 hr. per sem. PR: Math. 252. Number systems, the complex plane and its geometry, fractions, powers, roots and transformations, Holomorphic functions, power series, elementary functions, complex integration, representation theorems, the calculus of residues, analytic continuation and analytic function, Elliptic functions, Holomorphic functions of several complex variables.
357. *Calculus of Variations*. II. 3 hr. PR: Math 113, 252 (or 318). Necessary conditions and sufficient conditions for weak and strong relative minimums of an integral, Euler-Lagrange equation, Legendre condition, field construction, Weierstrass excess function, and the Jacobi equation.
- 375, 376. *Differential Geometry*. I, II. 3 hr. per sem. PR: Math. 151, 271. Elementary differential geometry. Transformation groups. Space curves. Geometry of surfaces.
- 381, 382. *Topology*. I, II. 3 hr. per sem. PR: Math. 252 or consent. A detailed treatment of topological spaces covering the topics of continuity, convergence, compactness,

and connectivity; product and identification spaces, function spaces, and the topology in Euclidean spaces.

- 383, 384. *Algebraic Topology*. I, II. 3 hr. per sem. PR: Math. 381, 341 (or consent). Singular homology and cohomology theories; homotopy theory and generalized homology theories.
- 385, 386. *Rings of Continuous Functions*. I, II, S. 3 hr. per sem. PR: Math. 341 and Math. 381, or consent. A study of the algebraic structure of the ring of all continuous real-valued functions on a topological space and its relation to the topological properties of the space.
- 451, 452. *Functions Analysis*. I, II. 3 hr. per sem. PR: Math. 181, 241, 252. A study of Banach and Hilbert spaces; the Hahn-Banach theorem, uniform boundedness principle, and the open mapping theorem; dual spaces and the Riesz representation theorem; Banach algebras; and spectral theory.
- 457, 458. *Theory of Partial Differential Equations*. I, II. 3 hr. per sem. PR: Math. 252. Cauchy-Kowalewski theorem, Cauchy's problem, the Dirichlet and Neumann problems, Dirichlet's principle, potential theory, integral equations, eigenvalue problems, numerical methods.
460. *Thesis*. I, II. 1-6 hr.
470. *Seminar in Geometry*. I, II. 1-12 hr.
- 471, 472. *Algebraic Geometry*. I, II. 3 hr. per sem. PR: Math. 141, 271. Foundations of affine geometry, the geometry of quadratic forms. Structure of the general linear group, symplectic groups, and orthogonal groups.
480. *Seminar in Topology*. I, II. 1-12 hr.
490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Supervised practices in college teaching of mathematics.
491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his program.
497. *Research*. 1-15 hr.
499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking coursework credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

PHILOSOPHY

Phil.

206. *Mathematical Logic II*. II. 3 hr. PR: Phil. 106 or Math. 161 or consent. A more formal and rigorous approach to the material covered in Phil. 106; selected problems in the philosophy of mathematics and the philosophy of logic. (Equiv. to Math. 261)
223. *Philosophy of Religion*. I or II. 3 hr. PR: Phil. 123 or consent. Advanced topics in the philosophy of religion.
250. *Social and Political Philosophy*. I or II. 3 hr. PR: Phil. 150 or consent. Advanced topics in social and political philosophy.
253. *Philosophy of Mathematics*. I or II. 3 hr. PR: Phil. 106 or consent. Contemporary viewpoints in the foundations of mathematics.

258. *Philosophy of the Social Sciences*. I. 3 hr. Philosophical problems associated with the concepts and methodology of the social sciences.
264. *Empiricism*. I or II. 3 hr. PR: Phil. 102. Locke, Berkeley, and Hume.
268. *Rationalism*. I or II. 3 hr. PR: Phil. 102. Descartes, Spinoza, and Leibniz.
289. *Advanced Topics in Logic*. I or II. 3 hr. PR: Phil. 206 or consent.
290. *Directed Studies*. I, II, S. 1-6 hr. (May be repeated for credit.) PR: Instructor's written consent. Individually supervised reading, research and projects.
304. *Symbolic Logic*. I or II. 3 hr. The logic of statements, relations and identity; introduction to the notions of consistency, completeness, and decidability.
305. *History of Philosophy*. I or II. 3-9 hr. Selected topics in the history of western philosophy, usually with concentration on one of the following periods: ancient, medieval, modern, or recent.
306. *Metaphysics*. I or II. 3 hr. Traditional problems associated with universals and particulars, reality and experience, causality, space and time, matter and mind, the nature of the self, etc.
310. *Ethics*. I or II. 3 hr. Selected topics in metaethics, the study of problems connected with the meaning and justification of ethical judgments.
321. *Seminar: Selected Topics*. 3-9 hr.
420. *Advanced Study*. I or II. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
490. *Teaching Practicum*. I or II. 1-3 hr. PR: Consent. Supervised practices in college teaching of philosophy.
496. *Graduate Seminar*. I or II. 1 hr. PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his program.
497. *Research*. 1-15 hr.
498. *Thesis*. I or II. 2-4 hr. PR: Consent.

PHYSICS

The Department of Physics offers studies leading to the degrees of Master of Science and Doctor of Philosophy in both experimental and theoretical physics with research concentrations in solid state, nuclear, atomic, and high energy physics, as well as to the areas of astrophysics, optics, electromagnetism, gravitation, and air pollution. The degree of Doctor of Philosophy requires completion of a research project upon which a dissertation is based. The Master of Science degree requires the writing of a thesis based on a research project or a study involving the history or teaching of physics.

The general Graduate School requirements for a graduate degree are in Part 2 of this *Catalog*. Graduate students in the M.S. program must receive credit for a minimum of 30 semester hours of coursework as approved by the student's adviser. A 2.75 grade-point average is required. The 30 hours may include no more than 6 hours of research credit and do not include any courses which are taken to remove deficiencies in the student's undergraduate background. In addition to coursework, a satisfactory performance on a written examination, completion of a thesis, and a final oral examination are required.

In general, to be admitted to the program for the Doctor of Philosophy, a student must pass a written admission examination and have completed the requirements for an approved M.S. degree. The program consists of basic gradu-

ate courses related to a specific area of research. To complete the requirements for the degree, the student must demonstrate reading proficiency in one foreign language (French, German or Russian), complete such courses as required by the department, pass the qualifying examination, submit an approved dissertation, and successfully defend his dissertation in a final oral examination.

Details concerning the M.S. and Ph.D. programs may be obtained from the Department of Physics.

Physics

- 201, 202. *Special Topics*. I, II. 1-3 hr. per sem. PR: Consent. Directed or independent study of topics of current interest in physics.
213. *Electronics*. I, II. 3 hr. PR: Physics 12. Theory, experiments, and application of electronics; with laboratory.
225. *Atomic Physics*. I, II. 3 hr. per sem. PR: Calculus, Physics 11, 12 or equiv. Relativistic mechanics, atomic structure and spectra.
- 231, 232. *Theoretical Mechanics*. I, II. 3 hr. per sem. PR: Calculus, Physics 11, 12 or equiv. Scalar and vector fields, curvilinear coordinate systems, kinematics of particle motion. Systems of particles, rigid body motion, central force fields, Lagrangian and Hamiltonian methods, oscillations.
- 233, 234. *Electricity, Magnetism, and Radiation Optics*. I, II. 3 hr. per sem. PR: Calculus, Physics 11, 12 or equiv. Electrostatics, magnetostatics, introduction to electrodynamics, and applications to optics.
- 241, 242. *Advanced Physics Laboratory*. I, II. 1-3 hr. per sem. Experiments in physics designed to implement theory courses, to give experience in data taking and instrumentation, and to learn methods of data evaluation and error analysis.
- 247, 248. *Physics Seminar*. I, II. No credit. Suggested for junior, senior, and graduate physics majors. This program of lectures acquaints students with topics of current interest in physics.
251. *Introductory Quantum Mechanics*. I. 3 hr. PR: Physics 124 (or 231, 232). Physical observables as operators. Operator equations, particularly the Schrodinger equation. Applications to one dimensional motion, the harmonic oscillator, atomic structure and spin. Equation of motion.
252. *Introductory Quantum Mechanics*. II. 3 hr. PR: Physics 251. Approximate methods of calculation. Theory of scattering, radiation. Applications to atomic, molecular, nuclear, and solid state physics.
263. *Nuclear Physics*. I, II. 3 hr. PR: Calculus, Physics 11, 12 or equiv.; Physics 124. The study of the characteristic properties of nuclei and their structure as inferred from nuclear decays and reactions, leading to a knowledge of nuclear forces and models.
- 271, 272. *Solid State Physics*. I, II. 3 hr. PR: Physics 225, or 125, 126. An introductory study of the properties of crystalline solids: includes crystal structure, binding, lattice vibrations and an investigation of thermal, electrical, magnetic, and optical phenomena based on the energy band theory.
283. *Thermodynamics*. I, II. 3 hr. PR: Calculus, Physics 11, 12 or equiv. The application of the fundamental laws of thermodynamics to physical and chemical systems.
284. *Kinetic Theory*. II. 3 hr. PR: Calculus, Physics 11, 12 or equiv. Introduction to the concepts of probability which lead to the derivation of the Boltzman, Fermi-Dirac, and Bose-Einstein statistics. The application of these statistics to physical and chemical systems.
301. *Special Topics*. I, II. 1-6 hr. per sem. PR: Consent. Primarily for graduate students. Specialized topics in fields of current interest in physics.

309. *Special Relativity*. I, II. 3 hr. per sem. PR: Calculus, Physics 231 or 233, consent. An in-depth study of special relativity emphasizing its logic and paradoxes with applications and its relation to electromagnetism and general relativity.
313. *Introductory Electronics*. S. 3 hr. PR: 1 year of college physics. Primarily for Education majors; not for graduate credit for science majors.
318. *Air Pollution Meteorology*. II. 3 hr. PR: 1 year college physics, calculus. Primarily for students in engineering (air pollution). Summary of descriptive and dynamic meteorology relevant to air pollution. Disposal of pollutants from a point source. Special topics of current or particular interest.
321. *Optics*. I, II. 3 hr. PR: Calculus, Physics 11, 12 or equiv. A basic course in physical optics covering radiation theory, diffraction, interference, polychromatic waves, scattering, polarization, double refraction, and selected topics in quantum optics.
- 331, 332. *Advanced Classical Mechanics*. I, II. 3 hr. PR: Physics 233, 234, and differential equations. Lagrange and Hamilton form of equations of motion, rigid bodies, small and nonlinear oscillations. Transformation theory relativistic dynamics, and systems with an infinite number of degrees of freedom.
- 333, 334. *Advanced Electricity and Magnetism*. I, II. 3 hr. PR: Physics 233, 234, and differential equations. Electrostatic and magnetostatic boundary value problems. Maxwell's equations for time varying fields. Green's functions and integral representations; applications to radiation, diffraction, wave guides, plasma physics, and relativistic motion of charged particles.
- 351, 352. *Quantum Mechanics*. I, II. 3 hr. per sem. PR: Physics 225, 251. This course covers a wide range of topics of current interest at a level such that a student should be able to read basic research papers in many fields upon completion. Topics covered are: approximation methods, representation theory, angular momentum, relativistic quantum mechanics, time dependent perturbation theory, identical particles, scattering, molecules, solids, magnetism, and second quantization of bosons and fermions.
354. *Outline of Modern Physics*. S. 3 hr. PR: 10 hr. of college physics, 1 year of college math. Techniques of apparatus construction and demonstration. Primarily for education majors; not open to physics majors.
- 355, 356. *Workshop for Physics Teachers*. SI, SII. 3 hr. per sem. PR: 1 year of college physics, 1 year of college math. Techniques of apparatus construction and demonstration. Primarily for education majors; not open to physics majors.
357. *Photography*. SI. 3 hr. PR: 1 year of college physics or equiv. The physics and chemistry of photography with practical experience. Primarily for education majors; not open to physics majors.
358. *Light*. SII. 3 hr. PR: 1 year of college physics or equiv. A demonstration course designed to illustrate the basic concepts covering light and optics. Primarily for education majors; not open to physics majors.
- 361, 362. *Molecular Physics*. I, II. 3 hr. per sem. PR: Physics 225. A presentation of the theory of molecular structure and spectra.
383. *Statistical Mechanics*. II. 3 hr. PR: Physics 283, 351, 352. Classical statistics; Boltzmann, Fermi-Dirac and Bose-Einstein statistics, theory of fluctuations and applications to physical systems.
- 387, 388. *Introduction to Mathematical Physics*. I, II. 3 hr. per sem. PR: Calculus, Differential Equations, Physics 11, 12 or equiv. Complex variables, differential equations, special functions, Fourier Series, Fourier and LaPlace transforms, Green's functions, theory of distributions, vector spaces, variational methods, equations of propagation, perturbation methods, tensor analysis.

- 401, 402. *Advanced Research Topics*. I, II. 1-6 hr. per sem. PR: Consent. Specialized topics in field of physics related to the research interests of the department. Open only to students who have completed most of the basic graduate courses.
410. *High Energy Physics*. I. 3 hr. PR: Physics 351, 352. Field theoretical interpretation of fundamental particles, interacting systems, S-matrix expansions, Feynman diagrams, and renormalization theory.
- 425, 426. *Atomic and Molecular Physics*. I, II. 3 hr. per sem. PR: Physics 225, 351, and 352. Hartree-Fock theory of angular momentum operators; group theory; Dirac theory; molecular vibrations; Breuckner-Goldstone applications to atomic structure.
453. *Advanced Quantum Mechanics*. I. 3 hr. PR: Physics 351, 352. Study of relativistic theory, many electron systems, introduction to quantum electrodynamics.
- 463, 464. *Advanced Nuclear Physics*. I, II. 3 hr. per sem. PR: Physics 225, 263, and 251. Detailed presentation of nuclear models, nuclear reaction mechanism, nuclear forces and theories of nuclear disintegrations.
- 471, 472. *Advanced Solid State Physics*. I, II. 3 hr. per sem. PR: Physics 271, 272, and 351. Detailed presentation of the theories of solids and its application to various topics: semiconduction, magnetism, etc. (Taught in alternate years.)
487. *Advanced Mathematical Physics*. I. 3 hr. PR: Physics 351 and 352. Mathematical techniques applied to problems in physics: group theory, functions of a complex variable, linear integral equations, geometry of finite dimensional vector spaces.
497. *Research*. I, II. 1-15 hr.

Astronomy

Physics

216. *Introductory Astronomy for Teachers*. S. 3 hr. Introduction to astronomy with special emphasis on the needs of physical science teachers and science club directors. Not open to students with credit for Physics 106.
255. *Mathematical Astronomy*. I, II. 3 hr. PR: Physics 106, Math. 16. Development of the implications of Kepler's Laws and Newton's Law of Gravitation.
267. *Basic Astrophysics*. I, II. 3 hr. PR: Physics 124 or equiv. Radiation theory, the Boltzmann and Soha equations, and the several equations of state. The H.R. diagram and the interpretation of normal stellar spectra. Physical processes in nebulae.
268. *Galactic Dynamics*. I, II. 3 hr. PR: Calculus. The kinematics and dynamics of the galaxy. Methods for determining the rotation parameters of the Milky Way galaxy from radial velocities and proper motions. Determination of stellar parallaxes, masses, and radii.
359. *Astronomy for Teachers*. S. 3 hr. PR: Consent. Basic concepts and methods in astronomy and how to teach them using the celestial sphere and geometrical tools. Observational work at night. The use of a telescope and camera.

POLITICAL SCIENCE

The graduate program in political science at WVU extends through the Doctor of Philosophy degree. Emphasis is placed upon more extensive and intensive training than is possible on the undergraduate level. This involves: (1) the development of a broader knowledge of the literature of political science; (2) some degree of specialization in one of the major areas of the discipline; and (3) training in the identification and analysis of problems in governmental theory and practice.

Master of Arts

Eligibility. Regular applicants for the Master of Arts degree should present a minimum of 12 semester hours of undergraduate credit in political science. In addition, the prospective student should have a minimum 2.5 overall grade-point average at the undergraduate level and should submit two letters of recommendation from faculty familiar with the student's work. Finally, students must submit the results of the Graduate Record Examination (both general aptitude and advanced area).

Students may be admitted on a "Regular with Deficiencies" basis or "Special Provisional Status." Such students must also submit Graduate Record Examination scores and two letters of recommendation. Students admitted in the above categories may be required to:

a. enroll in 9 semester hours of 200-level political science courses during the first semester and achieve at least a 3.0 grade-point average at the end of that semester or,

b. enroll in 12 semester hours of 100-level political science courses during the first semester for non-credit and achieve a 3.0 grade-point average at the end of that semester, or,

c. complete a combination of the above as determined by the graduate adviser.

Course Requirements. To have good standing in the Master of Arts program, a student must maintain an average of 3.0 in political science each semester.

Admission to candidacy for the Master of Arts degree in political science requires that the student complete 33 graduate credit hours (exclusive of Pol. Sci. 499, Colloquium), of which 27 hours must be in political science. Students may offer up to 6 hours in a cognate field if justified by the student's total program and approved by the department. All full-time students must enroll in Pol. Sci. 499, Colloquium, each semester in residence.

All students will be required to take at least one pro-seminar course in each of four designated areas of Political Science — i.e. American Government and Politics, Comparative Politics, International Relations, and Political Theory. Students also are required to take at least 3 hours of seminar work in two of the fields (400-level courses) and an additional 6 hours of methodology.

The preparation of a master's thesis is optional. If the student elects to write a master's thesis in lieu of coursework, the thesis will carry 6 credit hours. The program options are:

Non-Thesis Option — Total of 33 hours: Methodology, 6 hr.; Proseminars, 12 hr.; Seminars, 6 hr.; Electives, 9 hr. in courses at 200-level or above.

Thesis Option — Total of 33 hours: Methodology, 6 hr.; Proseminars, 12 hr.; Seminars, 6 hr.; Electives, 3 hr.; Thesis, 6 hr.

Students are required to spend at least one semester in residence enrolled in a full-time graduate program of no less than 9 semester hours for that semester. Two summer sessions may count as one semester.

Final Examination. Students will be expected to pass final written examinations in two of the four fields of political science — American Government and Politics, Comparative Politics, International Relations, and Political Theory. The student will select the two fields in which the student wishes to be examined. In addition, each student will submit two research papers (one from each area of specialty designated by the student) as evidence of research competence. Students who elect to write a thesis will submit their thesis instead of research papers. Finally, an oral examination may be required if performance on the written examinations leaves doubt as to the student's mastery of the subject.

Students who fail final written examinations may be allowed to re-take them at the next regularly scheduled examination period. It is contrary to departmental policy to give a third examination.

Financial Assistance. Students interested in financial assistance should apply directly to the Department of Political Science.

Doctor of Philosophy

Eligibility

Applicants for the Doctor of Philosophy degree should present a Master's degree in Political Science or a recognized sub-field thereof. Applicants who have Master's degrees in progress may apply and be admitted conditionally, pending completion of the M.A. degree within the first semester in the Ph.D. program. In addition, the prospective student should have a 3.0 grade-point average at the graduate level and should submit three letters of recommendation from faculty familiar with the student's work. Finally, students must submit the results of the Graduate Record Examination (both general aptitude and advanced area).

The department does not provide for provisional admission of Ph.D. students.

Course Requirements

To have a good standing in the Doctor of Philosophy program, a student must maintain a minimum grade-point average of 3.0 in political science each semester. Students are required to spend at least one year (two semesters) in residence enrolled in a full-time graduate program of no less than 9 semester hours each semester. All full-time students must enroll in Pol. Sci. 499, Colloquium, during each semester of residence.

All students must present two methodology courses: Pol. Sci. 300 and Pol. Sci. 400. In addition, students must complete no less than 12 hours in Seminars at the 400 level. If the student does not have a WVU Master's degree or has not taken the Proseminars, 12 hours of Proseminars must be completed in American Government and Politics, Comparative Politics, International Relations, and Political Theory. Twelve hours of electives (in courses at the 200-level or above) may be taken in political science or another discipline if such courses are (1) related to the student's areas of concentration, (2) not used as a substitute for the curriculum in political science, and (3) approved by the student's faculty adviser.

All students must complete a research tool skill requirement which is based on the student's needs and total program of study. There are four options in satisfying this requirement: (1) reading competence in two foreign languages with aid of dictionary; (2) reading competence in one foreign language without aid of dictionary; (3) reading competence in one language with aid of dictionary and completion of 6 credit hours in statistics and/or computer science; and (4) completion of 9 credit hours in statistics and/or computer science. If none of these options are relevant to the student's program and individual needs, then petition may be made to the department for a substitute.

Final Examination

Before admission to candidacy for the Doctor of Philosophy degree, students will be expected to pass final written examinations in three of the four fields of political science — American Government and Politics, Comparative Politics, International Relations, and Political Theory. An oral examination may be required if a student receives a "conditional pass" on the written examination.

Dissertation

Upon admission to candidacy for the Doctor of Philosophy degree, the candidate must select a topic for a dissertation under the direction of the candidate's adviser, complete a dissertation which makes a contribution to knowledge in the candidate's area of concentration, and pass an oral examination based primarily upon the dissertation. After successful completion of the oral examination, the candidate will be recommended for the degree.

Political Science

Pol. Sci.

200. *Research Materials and Techniques in Political Science*. I. 3 hr. Introduction to the techniques and methods of research in political science with particular emphasis upon political behavior.
201. *Introduction to Political Behavior*. I, II. 3 hr. PR: Upper-division standing. Methods, theories, and substantive interests identified with behavioral approach to study of politics.
211. *Problems of American National Government*. II. 3 hr. Course gives recognition to the major contemporary problems of government. Extensive reading of background materials, as well as current literature.
213. *American Constitutional Law*. I. 3 hr. PR: Pol. Sci. 2 or consent. Primarily for seniors and graduate students. Basic principles of American constitutional law as developed through interpretation with special emphasis on constitutional theories and national development.
214. *Civil Rights and Liberties in the United States*. II. 3 hr. PR: Pol. Sci. 213 or consent. The scope and meaning of civil liberty guarantees in the United States Constitution, as illustrated by cases involving original constitutional provisions, the Bill of Rights, and Civil War amendments with special attention to the rule of law; free speech, press, religion, assembly, and petition; personal security; racial discrimination; and the labor problem.
215. *American Constitutional Development I*. I. 3 hr. PR: Pol. Sci. 2 or consent. American constitutional development, with special emphasis on origins of constitutionalism here; liberty vs. government; mixed government; separation of powers; problem of federalism and Philadelphia Convention of 1781; Marshall court and establishment of judicial review; Federalist vs. States Rights construction of Constitution; Jacksonian influences; Taney Court prelude to Civil War, secession, and conflict, heralding constitutional change.
216. *American Constitutional Development II*. II. 3 hr. PR: Pol. Sci. 2, 215, or consent. American constitutional development, with special attention to reconstruction, Supreme Court, and Fourteenth Amendment; *laissez-faire* and commerce clause; stirrings of reform toward a constitutional revolution under New Deal; changing federal-state relationships; impact of war on constitutional interpretation; expand-

ing role for the president in domestic matters and foreign relations; the Warren Court.

221. *West Virginia Government and Administration*. I, II. 3 hr. Organization and operation of the state government of West Virginia.
225. *Municipal Government*. I. 3 hr. Legal basis, structure, processes and politics of urban governments and cooperative-conflict relations with other governmental units.
226. *Problems of State and Local Government*. II. 3 hr. PR: Pol. Sci. 120 or equiv. Examination of current problems of state, county, and municipal governments.
231. *History of Political Parties*. I. 3 hr. Growth of political parties in the United States. Analysis of issues in presidential campaigns as they relate to political party development.
232. *Public Opinion and Propaganda*. II. 3 hr. Techniques of sampling and measuring public opinion; detection of propaganda; nature of propaganda and methods of the propagandist.
233. *Current Political Issues*. I. 3 hr. Political party platforms and the major issues of the political campaign.
234. *The Legislative Process*. II. 3 hr. Structure and organization of legislative bodies. Powers of legislature. Detailed study of law-making procedures. Influence of outside forces.
235. *Introduction to Public Analysis*. I. 3 hr. Examination of public policies and programs in several issue areas. Focuses on problemsolving at all levels of government in the United States.
240. *Public Administration and Social Change*. I. 3 hr. PR: Pol. Sci. 140. Study of administrative policy and organization as it relates to social, economic, and technological change in American society.
244. *Administrative Law and Regulation*. II. 3 hr. PR: Pol. Sci. 140 or consent. The law of administration, primarily by case method, covering administrative powers, procedure in administrative adjudication and rule-making, discretion, judicial control, and administrative liability.
246. *Comparative Public Administration*. II. 3 hr. Theory and practice of public administration in diverse cultures and national political systems.
251. *Government of Soviet Union and Eastern Europe*. II. 3 hr. PR: Pol. Sci. 1 or 2. Politically undemocratic governments. Background of dictatorships generally, followed by treatment of several modern dictatorships.
252. *British Government and Politics*. II. 3 hr. Intensive study of British government with emphasis on internal and external policies, primarily during twentieth century.
253. *Contemporary Governments of the Commonwealth*. II. 3 hr. Analysis of political relationships between members of the Commonwealth. Comparative study of governments and politics of the dominions, with particular reference to Canada and Australia.
254. *Governments of Asia*. I. 3 hr. Survey of political institutions and governmental processes of Japan, China, and India, with a special emphasis on the analysis of contemporary political problems of the governments.
255. *Governments of Latin America*. I. 3 hr. Comparative study of the major nations of Latin America.
256. *Governments of the Middle East*. II. 3 hr. Governments and political forces of the Middle East.

257. *Governments of Southeast Asia*. II. 3 hr. Political institutions and governmental processes of Southeast Asian countries with special emphasis on analysis of contemporary political problems of the governments.
258. *Politics of Africa*. I. 3 hr. The historical legacies and current political processes of tropical African countries. Designed primarily for secondary-level social studies teachers pursuing graduate training.
259. *Political Tour of Europe*. 6 hr. PR: Pol. Sci. 1, 2, or consent. Governments and politics in selected European countries. Lectures and discussions supplement observation while visiting these countries.
261. *International Organization*. I. 3 hr. PR: Pol. Sci. 160 or consent. Agencies created since close of World War II. Some reference to development of international law and United Nations.
263. *Public International Law*. I. 3 hr. Law governing relations among nations, including development of rules, means of enforcement, and conflicts between theory and practice.
264. *Conduct of American Foreign Relations*. I. 3 hr. Basic concepts about and factors influencing the decision-making process and the conduct of United States foreign policy, with special attention to the problems of ends and means of a democracy, pressure interest groups (i.e. the military-industrial complex and the administrative bureaucracy); recent theories, analytical tools, and methodology in the problem areas of conflict-resolution, nonconsensus situations, and inter-nation influence; regional patterns, problems, and prospects of United States policy in Europe, Africa, Asia, and Middle East, and the Soviet bloc since 1945.
265. *Basic Factors in Power Politics*. II. 3 hr. PR: Pol. Sci. 2 or consent. Factors of power in the nation-state system. Evaluation of nationalism and concepts of national interest in modern world politics.
266. *Soviet Foreign Policy*. I. 3 hr. PR: Pol. Sci. 150 or 160 or consent. Basic concepts about and factors influencing choice in the formulation and execution of Soviet foreign policy; development and present patterns in Soviet foreign relations with key states and the United Nations; possible problems and prospects in future Soviet relations.
267. *Latin America in International Affairs*. II. 3 hr. PR: Pol. Sci. 160 or 225 or consent. The relations of Latin American states among themselves, with the United States, with the United Nations, with regional organizations, and with non-western states. Analysis in depth of the Monroe Doctrine and its corollaries, and the inter-American system.
268. *Inter-State Conflict in International Affairs*. II. 3 hr. PR: Pol. Sci. 160 or consent. Conflict in inter-state relations, in particular armed conflict between nations. Attention to the role of force, impact of modern technology and nuclear weaponry, theoretical and research approaches to causes and nature of conflict, and different modes of conflict control and resolution.
269. *Far Eastern International Relations*. II. 3 hr. PR: Pol. Sci. 160 or 254 or 257 or consent. International relations of Far Eastern countries with emphasis on historic roots of recent conflicts, the competitive role of the United States and the Soviet Union, confrontation between the communist and anti-communist countries in the region, and the regional cooperation and security problems in the post-war period.
270. *History of Political Thought: Plato to Machiavelli*. I. 3 hr. Major political ideas from the Greeks to sixteenth century with special emphasis upon development of natural law and western conception of justice.

271. *History of Political Thought: Machiavelli to Bentham*. II. 3 hr. PR: Pol. Sci. 270 or consent. Political ideas which developed from the separation of faith and reason, the culmination of this movement in rational integral liberalism, and the origins of modern conservatism as expounded by Edmund Burke.
272. *Recent and Contemporary Political Thought*. I. 3 hr. Examination of integral liberalism and the forces leading to the decline of liberalism and a critical analysis of the fascist and communist ideologies with their threat to the traditions of western civilization embodied in Christianity and conservatism.
273. *American Political Theory*. II. 3 hr. PR: Pol. Sci. 270, 271, 272, or consent. Major political ideas and their influence upon American society and government from seventeenth century to present.
275. *Foundations of Jurisprudence*. II. 3 hr. Inquiry into: (a) nature, end, and sanctions of law; its sources, forms, and modes of growth, as evidenced in typical legal systems; general juristic conceptions of rights, duties, and liabilities as well as persons, acts, and things; (b) main schools of jurisprudence — analytical, historical, philosophical, sociological, and that of legal realism; (c) economic interpretation of law and its relation to property and interest; (d) problem of legal rule versus discretion; (e) meaning of obligation, with special reference to contract; (f) stages in the development of legal institutions, forms and procedures (as exemplified in trials); (g) significant theories about law; and (h) status of law in today's world.
290. *Socio-Politics of Africa*. I. 3 hr. Political behavior and its social bases in tropical Africa, with particular reference to eastern and central Africa.
295. *The Politics of Planned Development*. II. 3 hr. Political aspects of directed economics and technological change, with special reference to politics of national development planning and development process.
300. *Introduction to Political Science Methodology*. I. 3 hr. General structure of political science methodology with emphasis on constructing research hypotheses, data collection and analysis, scientific approach to political problem solving, interpretation of quantitative analysis, and research project.
310. *American Political Institutions*. I. 3 hr. A systematic and critical treatment of the major theoretical perspectives and research findings in the field of American politics. Intended primarily for graduate students.
335. *Theory of Public Policy Development*. II. 3 hr. PR: Pol. Sci. 235 or equiv. Major theories of public policy formation. Emphasizes policy formation in areas such as air and water pollution, public education, science policy, race relations, and transportation.
345. *Public Administration and Policy Development*. II. 3 hr. PR: Pol. Sci. 140 or consent. Decision-making and policy development in the administrative process by the case method.
350. *Proseminar in Comparative Policies*. I. 3 hr. Modern political institutions with particular attention to recent research in the field.
360. *Proseminar in International Relations*. I, II. 3 hr. PR: Graduate student standing. An intensive and systematic critical analysis of contemporary theory and research representative of the major foci in international relations.
370. *Proseminar in Political Theory*. I. 3 hr. PR: Pol. Sci. 270, 271, or consent. A survey course designed for graduate students which covers the major trends within political theory. Perennial questions of political theory, such as property, liberty, state power, and the good political system.
374. *Problems in Contemporary Political Thought*. II. 3 hr. Current trends in political thought through examination of the works of contemporary writers.

391. *Leadership and Authority in Africa*. II. 3 hr. Traditional, colonial, and contemporary political leadership and authority patterns in Africa south of the Sahara.
394. *The Theory of Political Development*. I. 3 hr. Contemporary theories concerning political change and the relationship of political change to economic and technological development with particular reference to the new nations.
400. *Scope and Methods of Political Science*. II. 3 hr. PR: Pol. Sci. 300 or consent. Investigation of advanced topics in political research methodology with particular reference to the conceptual and technical problems of basic research in political behavior. Required of doctoral students.
403. *Internship*. I, II. 6-9 hr. per sem.; students may enroll more than once. PR: Consent. A work internship in government or political agencies designed to give students actual experience in a particular field of political science.
- 410, 411. *Directed Reading and Research in American National Government*. I, II. 2-4 hr. per sem.; students may enroll more than once.
419. *Seminar in American National Government*. I. 3 hr. PR: Consent.
- 420, 421. *Directed Reading and Research in State Government*. I, II. 2-4 hr. per sem.; students may enroll more than once.
- 425, 426. *Directed Reading and Research in Local Government*. I, II. 2-4 hr. per sem.; students may enroll more than once. PR: Pol. Sci. 225 or consent.
429. *Seminar in State and Local Government*. I. 3 hr. PR: Consent.
- 430, 431. *Directed Reading and Research in Politics*. I, II. 2-4 hr. per sem.; students may enroll more than once. PR: Pol. Sci. 130 or consent.
439. *Seminar in Politics and Policy Development*. I. 3 hr. PR: Consent.
- 440, 441. *Directed Reading and Research in Public Administration*. I, II. 2-4 hr. per sem.; students may enroll more than once. PR: Pol. Sci. 140 or consent.
449. *Seminar in Public Administration*. II. 3 hr. PR: Consent.
- 450, 451. *Directed Reading and Research in Comparative Government*. I, II. 2-4 hr. per sem.; students may enroll more than once.
459. *Seminar in Comparative Government*. II. 3 hr. PR: Consent.
- 460, 461. *Directed Reading and Research in International Relations*. I, II. 2-4 hr. per sem.; students may enroll more than once.
469. *Seminar in International Relations*. II. 3 hr. PR: Consent.
- 470, 471. *Directed Reading and Research in Political Theory*. I, II. 2-4 hr. per sem.; students may enroll more than once.
479. *Seminar in Political Theory*. II. 3 hr. PR: Consent.
480. *Thesis*. I, II. 2-6 hr.
497. *Research*. 1-15 hr.
499. *Colloquium*. I, II. 1-6 hr.

PSYCHOLOGY

Admission. Students are admitted only at the beginning of the first semester. Applications must be completed by the preceding February 15. Acceptance will be based on: (1) adequate academic aptitude at the graduate level as measured by the Graduate Record Examination; (2) a minimum grade-point average of 2.5 (C+); (3) personal qualities in the applicant which are predictive of success in graduate study and satisfactory professional placement after graduation; (4) adequate preparation in the biological and social sciences, ex-

perimental psychology, and statistics. By permission, deficiencies in preparation may be made up after admission to the department. Students are expected to maintain a 3.0 (B) average in their psychology courses during the first graduate year, and to present a final 3.0 average in all psychology courses attempted.

Special Graduate Students. Graduate courses in psychology are open only to regular graduate students except by special departmental permission.

Master of Arts Degree (M.A.). Two years of full-time study with a minimum of 48 hours of credit are required for the M.A. degree. Six hours of credit may be counted for the M.A. thesis if such thesis is required by the option chosen by the student. The following options are available for the M.A. degree:

1. *Intermediate Degree for Ph.D. Candidates.* Students who are candidates for the Ph.D. are expected to complete an M.A. thesis and will receive the M.A. degree upon completing the thesis and credit hour requirements.

2. *Professional M.A. Degree in Clinical Psychology.* This program prepares the student for work in hospitals, mental health clinics, school mental health programs, and the like. No thesis is required. (An additional 12 hours of work in education will qualify students in this program for provisional certification as school psychologists in West Virginia.)

Doctor of Philosophy Degree (Ph.D.). The doctoral programs aim to prepare a small number of well-qualified psychologists for four types of careers: (1) teaching and research in experimental psychology (with emphasis on learning); (2) teaching and research in life-span developmental psychology; (3) teaching and research in educational psychology; and (4) teaching, research, and practice in clinical psychology. All doctoral programs require an academic year of supervised college teaching. A calendar year in an approved internship setting is required of all clinical students.

Students are accepted for study toward the Ph.D. objective upon entry into the department. They are formally admitted to doctoral study only after completion of the master's degree or its equivalent and may be subject to a screening examination to determine their readiness for doctoral work. During the first year of graduate work beyond the master's degree, the student will be admitted to a comprehensive preliminary examination in which competence must be demonstrated in the major area of specialization and a knowledge of such other areas of psychology as may be required of all graduate psychology students.

Upon passing the preliminary examination, the student will be formally promoted to candidacy for the doctorate. The student will then be assigned a committee which will direct further coursework and the dissertation research, and will approve the internship setting.

After completion of a satisfactory dissertation and all other requirements, the candidate will take a final examination, written or oral, concerning the major emphasis and the dissertation.

Psychology

Psych.

- 201. *Personnel Psychology.* I or II. 3 hr. PR: Psych. 1, Stat. 101, or equiv. Application of psychological principles and techniques to the problems of measurement and prediction of proficiency in industry and society.
- 213. *Directed Studies.* I, II, S. 1-3 hr. per sem. PR: Consent. Individually supervised reading, research and/or classroom management projects. No more than 6 hr. may be applied to major requirements.

218. *History of Psychology*. I or II. 3 hr. PR: 9 hr. psychology or graduate standing. The development of the science and concepts of psychology from their origin in philosophy, physiology, and medicine up to modern era.
219. *Survey of Psychology*. I. 1 hr. PR: Psychology major. Overview of modern psychology with special reference to problems of graduate and professional training and employment opportunities.
223. *Learning and Thinking*. I, II, S. 3 hr. PR: 9 hr. psychology or graduate standing. Introduction to complex human behavior with emphasis upon processes underlying learning and cognition. Special attention to mechanisms of memory, language, verbal behavior, and conceptual processes.
231. *Behavior of Organisms*. II. 4 hr. PR: Biol. 1 and 2 or Psych. 1 or equiv. Principles of individual and group behavior. (Also listed as Biol. 231.) (Lab fee \$15.00.)
232. *Physiological Psychology*. I or II. 3 hr. PR: 9 hr. psychology or graduate standing. Introduction to physiological mechanisms and the neural basis of behavior. (Also listed as Biol. 232).
242. *Infant Behavior*. I or II. 3 hr. PR: 9 hr. psychology including Psych. 141 or CDFR 141, 142, or graduate standing. Systematic investigation of basic areas of human development during the first years of life. Infant motor development, conditioning and learning, language development, sensory and motor processes.
243. *Child Behavior*. I or II. 3 hr. PR: 9 hr. psychology including Psych. 141 or CDFR 141, 142, or graduate standing. Examination of the literature in experimental child psychology including growth trends in behavior in the physical, intellectual, emotional, social and personality areas.
244. *Adolescent Behavior*. I or II. 3 hr. PR: 9 hr. psychology including Psych. 141 or CDFR 141, 142, or graduate standing. Psychosexual, psychosocial, and other focal problems of development during adolescence are stressed. Cultural influences such as compulsory education, social movements, delinquency, sex roles, and drug abuse are discussed in the context of adolescent development.
245. *Adult Behavior*. I or II. 3 hr. PR: 9 hr. psychology including Psych. 141 or CDFR 141, 142, or graduate standing. Cognitive and personality changes from maturity to old age. Psychological reactions to physiological change and to the establishment and dissolution of family units. Problems of intergenerational differences in adult behavior.
253. *Attitudes and Social Change*. I. 3 hr. PR: 9 hr. psychology including Psych. 151. Nature of attitudes and opinions, attitude measurement, opinion changing, propaganda use and analysis, social psychology of mass media, democratic values, and public opinion. Of interest to students in psychology, sociology, political science, and journalism.
262. *Introduction to Clinical Assessments*. I. 3 hr. PR: Stat. 101, consent. Theory underlying the construction and use of psychometric measurement techniques for evaluating aptitudes, interests, attitudes and personality.
263. *Introduction to Personality*. I, II, S. 3 hr. PR: 9 hr. psychology or graduate standing. Development and significance of the personality concept in psychology including a survey of the major theories such as psychoanalytic, interpersonal, trait, and learning.
264. *Psychology of Adjustment*. I, II, S. 3 hr. PR: 9 hr. psychology or graduate standing. Dynamic principles of human personality adjustment. Primarily for non-majors.
271. *Introduction to Clinical Psychology*. I or II. 3 hr. PR: 9 hr. psychology or graduate standing. Of interest to advanced undergraduates and graduates in education, guidance, personnel, pre-medicine and social work, as well as professionally-oriented students in psychology. Review of concepts, techniques, and professional roles in clinical psychology.

274. *Introduction to Behavior Modification*. 3 hr. PR: 9 hr. psychology including Psych. 122 or 124 or graduate standing. Behavior therapy and modification including desensitization, covert sensitization, interpersonal skill training; aversion techniques and applied behavior analysis employing operant principles.
276. *Group Methods of Behavior Change*. 3 hr. PR: 9 hr. psychology or graduate standing. Group approaches to treatment and enrichment of human behavior. Focus on interpersonal behavior.
279. *Community Psychology*. 3 hr. PR: 9 hr. psychology, including Psych. 151 or graduate standing. Psychological principles applied to treatment and intervention strategies at the community level. Manpower development, organizational change, and systems analysis.
281. *Abnormal Psychology*. I and II. 3 hr. PR: 9 hr. psychology or graduate standing. Major behavioral disorders — neurosis, psychosis, and character disorders. Emphasis on developmental dynamics leading to these disorders, and on their psychological treatment.
282. *Exceptional Children*. I or II. 3 hr. PR: 9 hr. psychology including Psych. 141, or CDFR 141 or 142, or graduate standing. Study of children who present psychological problems: (1) exceptional mental retardation or advancement; (2) organic disabilities having behavioral consequences, such as cerebral palsy or deafness; (3) behavior disorders.
304. *Leadership and Human Relations in Working Groups*. I or II. 1-3 hr. PR: Consent. Individual work related to either research or practice in the field of human relations training programs.
307. *Practicum in Industrial Interviewing*. I or II. 3 hr. PR: Psych. 201 or consent. Intensive review of principles of selection and validation. Practice interviews applying non-directive techniques in employment and other types of interview.
311. *Research Design in Psychology*. I. 3 hr. PR: Elementary statistics and consent. For majors only. Issues and elements of empirical inquiry, quantification of concepts, manipulation, controls and confounds, examination of exemplary research designs in specific content areas of psychology.
312. *Data Analysis in Psychology*. II. 3 hr. PR: Psych. 311 or consent. For majors only. Inferential statistics, analysis of variance, simple correlation and regression, special topics in data analysis in psychology.
313. *Directed Study*. I, II, S. 1-3 hr. per sem. PR: Consent. Directed reading and research in special areas. (Undergraduates register for such projects under Psych. 213.)
314. *Theory of Tests and Measurement*. I. 3 hr. PR: Elementary statistics and consent. Theory underlying psychological scaling, mathematical models, classical psychometrics. Introduction to concepts of reliability, validity, correlation and regression, multivariate analysis procedures.
315. *Multivariate Analysis*. I or II. 3 hr. PR: Psych. 311, or 314, or equiv., and consent. Correlational methods in psychology with application to typical research problems. Includes simple matrix algebra, multiple correlation, discriminant analysis, and an introduction to factor analysis. (Equiv. to Stat. 341.)
321. *Sensory Processes*. I or II. 3 hr. PR: Psych. 121, or 122, or equiv. Psychophysics of vision and audition are analyzed and related to current theories. Methods of research on sensory processes are reviewed.
322. *Conditioning and Learning*. I or II. 3 hr. PR: Psych. 122, consent. Review of current research in operant and classical conditioning. Controversial issues in learning are reviewed in light of recent research and theories.

323. *Perceptual and Cognitive Processes.* I or II. 3 hr. PR: Psych. 121, or equiv. Consideration of classical and contemporary research and theory on perception and cognitive processes, including concept formation and thinking.
324. *Motivation.* I or II. 3 hr. PR: Psych. 121, or 122, or equiv. Survey of experimental data and theory in the area of motivation as it relates to learning and personality.
331. *Principles of Animal Behavior.* I. 4 hr. PR: Psych 231 or equiv. Concepts in ethology and the principles governing interactions between animals. A comparative approach to animal behavior. (Also listed as Biol. 331.)
332. *Physiological Mechanisms of Animal Behavior.* II. 3 hr. PR: Psych. 231 or 232 or equiv. Explores the way behavior is controlled in a wide variety of animals so that communalities and varieties of neural and endocrine mechanisms may be better understood. (Also listed as Biol. 332.)
338. *Seminar in Animal Behavior.* I or II. 2 hr. per sem. PR: Consent. Current research and problems in animal behavior. (Equiv. to Biol. 338.)
340. *Advanced Developmental Psychology.* I or II. 3 hr. PR: Psych. 141, 314, or equiv. and consent. Research methods and substantive findings in the psychology of human development from birth to death, emphasizing developmental processes over the entire life-span.
347. *Comparative Psychology.* I or II. 3 hr. PR: Biol. 266, Psych. 121 or 122. Comparison of the structure of representative animals of the various phyla in relation to differences in behavior.
351. *Advanced Social Psychology.* I or II. 3 hr. PR: Psych. 151 and consent. Consideration of contemporary theory and practice in social psychology.
355. *Behavioral Science and Health Care.* II. 3 hr. PR: Consent. Principles of behavioral science applied to issues in physical and mental health care. Topics include the study of interpersonal roles and games, various cultural "healing" practices, personal and social aspects of illness, family disorganization, and hospitals and related institutions. (Equiv. to Behav. Med. & Psychiatry 355.)
363. *Personality Theory and Research.* I or II. 3 hr. PR: Psych. 263, 314, or equiv. Intensive analysis of current research and theory in the psychology of personality.
379. *Professional Problems in the Practice of Psychology.* I or II. 2 hr. PR: Consent. Current problems in the practice of clinical psychology.
381. *Behavior Pathology.* I or II. 3 hr. PR: Psych. 263, 281, consent. Advanced study of etiology and dynamics of severe behavior pathology.
397. *Master's Thesis.* I and II. 1-6 hr. PR: Consent.
409. *Seminar: Industrial.* I or II. 2 hr. PR: Consent. Current research and problems in industrial psychology.
416. *Factor Analysis.* I or II. 3 hr. PR: Psych. 315, consent. Alternate methods for factor extraction, communalities, rotation in orthogonal and oblique space, and estimation of factor scores. (Equiv. to Stat. 446.)
418. *Theory Construction.* I or II. 3 hr. PR: Consent. Methods of theory construction and role of theory in selected psychology areas.
419. *Seminar: Methodology.* I or II. 2 hr. per sem. PR: Consent. Current problems in statistics and research or instructional methods.
423. *Human Learning.* I or II. 3 hr. PR: Psych. 122 or equiv. Historical and contemporary review of research and theory in verbal learning, transfer, mediation, retention and memory processes, including motor skill learning and verbal conditioning.
429. *Seminar: Learning.* I or II. 2 hr. per sem. PR: Consent. Current research and problems in the psychology of learning.

431. *Advanced Physiological Psychology*. I or II. 2 hr. PR: Psych. 331. Neuroanatomical and neurophysiological correlates of complex behavior.
 432. *Physiological Psychology Laboratory*. I or II. 2 hr. PR: Psych. 331, consent. Research techniques used in exploring the neural basis of behavior.
 439. *Seminar: Physiological*. I or II. 2 hr. per sem. PR: Consent. Current research and problems in physiological psychology.
 441. *Developmental Psychophysiology*. I or II. 3 hr. PR: Psych. 331, 340, consent. Current research and problems of developmental relationship between physiological response systems and processes through the human life-span.
 442. *Developmental Cognition and Language*. I or II. 3 hr. PR: Psych. 340, consent. Cognitive change, language acquisition and use throughout the human life-span. Interplay of language with conceptual organization and mediating processes.
 444. *Socialization*. I or II. 3 hr. PR: Psych. 340, consent. The current state on theory and research in the field of life-span socialization with emphasis on consideration of age-related changes in agents, mechanisms, goals and products inherent in organism-environment interaction.
 446. *Development Perception*. I or II. 3 hr. PR: Psych. 340, consent. Preview of research investigating relationship between maturational and perceptual processes through life-span. Development of attention, perceptual organization, mechanisms of perceptual development, and influence of age on sensory processing.
 447. *Developmental Learning Processes*. I or II. 3 hr. PR: Psych. 340, consent. Review of research and theory related to interaction of learning and maturational processes in children, retardates and adults. Concept formation, discrimination learning, learning set, conditioning, verbal and language behavior.
 448. *Advanced Personality Development*. I. 3 hr. PR: Psych. 340, consent. Review and examination of current research and theory in personality development through human life-span.
 449. *Seminar: Developmental*. I or II. 2 hr. per sem. PR: Consent. Current research and problems in developmental psychology.
 452. *Group Dynamics*. I or II. 3 hr. PR: Psych. 151 or equiv., consent. Psychological and sociological approaches to dynamics of group processes. Leadership, informal communication and group processes, relations of group aims to group organization, and effects of group on personality.
 459. *Seminar: Social*. I or II. 2 hr. per sem. PR: Consent. Research and problems in social psychology.
 469. *Seminar: Personality and Abilities*. I or II. 2 hr. per sem. Research and problems in areas of personality and trait measurement.
- NOTE: All courses in 470 series are professional skills courses open only to degree candidates in psychology except by special department permission.*
470. *Objective Methods of Personality Assessment*. I. 3 hr. PR: Consent. Observation, science and psychological assessment; development of psychological tests; behavioral rating scales, and assessment; interview as assessment instrument.
 471. *Clinical Assessment Methods*. II. 3 hr. PR: Psych. 470, consent. Intelligence testing, performance and non-language tests, assessment of central nervous system impairment, and assessment of child and geriatric patients.
 473. *Advanced Personality Assessment*. I or II. 3 hr. PR: Psych. 471, consent. Supervised practice in diagnostic application of personality assessment techniques. Includes clerkship in various mental health facilities.

- 474, 475. *Behavior Modification*. I, II. 3 hr. per sem. PR: Psych. 322, consent. Theory and practice of behavior modification based on learning theory and dynamic personality theory problems.
476. *Group Methods of Behavior Modification*. I or II. 3 hr. PR: Consent. Principles of group dynamics, personality, and learning theory to use of group processes for modification of abnormal behavior patterns.
477. *Clinical Psychology Practicum*. I and II. 1-6 hr. per sem. PR: Consent. Supervised practice of psychological techniques in clinics or institutional settings. Experience in psychological testing, interviewing, report writing, case presentation, interpretation of tests and supportive counseling. (Primarily for students in master's program in clinical psychology.)
478. *Advanced Clinical Practicum*. I and II. 1-6 hr. per sem. PR: Consent.
479. *Seminar: Clinical*. I or II. 2 hr. per sem. PR: Consent. Research and problems in clinical psychology.
485. *Seminar in Community Psychology*. I or II. 2 hr. per sem. PR: Consent. Research and problems in community psychology.
489. *Seminar: Abnormal*. I or II. 2 hr. per sem. PR: Consent. Research and problems in abnormal psychology.
490. *Teaching Practicum*. I and II. 1-3 hr. per sem. PR: Consent. Supervised practice in college teaching of psychology.
497. *Research*. I and II. 1-15 hr. per sem. PR: Consent.

PUBLIC ADMINISTRATION PROGRAM

The Public Administration Program offers a fully developed public administration curriculum for graduate students seeking either the Master of Public Administration degree or a specialization in the field to form a part of another graduate degree program. This coursework provides a professional orientation to the primary facets of public management.

Master of Public Administration Degree

The Master of Public Administration curriculum is designed to serve the needs of students trained in a wide variety of fields who wish to pursue a public service career. The program directs particular attention to developing an understanding of the management function in the public context as well as preparation in utilizing advanced management techniques. The study program furnishes the student with opportunities to attain a comprehensive understanding of governmental policy-making and policy execution. The processes of administration are reviewed in terms of their relationship with and applicability to the functioning of government at all levels.

The program is oriented toward present and future practitioners in the public service and is designed to supply an academic foundation and a comprehension of the range of processes and management approaches employed in public administration. These include program planning, personnel administration, budgetary policy-making and execution, systems approaches, organizational dynamics, and leadership. Particular stress is placed on those functions and issues that require the greatest degree of adaptation, innovation, and responsiveness on the part of the professional administrator.

Curriculum. The curriculum of the program reflects the diversity of skills required by all levels of government. The range of needs is broad in scope;

students apply from diverse backgrounds, including political science, the other social sciences, the physical sciences, the humanities, and from positions in the public service.

The program requires a total of 38 credit hours. This includes 24 hours of public administration courses, 12 hours of electives, and a colloquium held biweekly each semester.

It is strongly urged that electives be taken in an area of specialization. These areas include public management (local, state, national); human resources administration; management science; development administration; environmental administration; public law; and fiscal and budgetary analysis.

Students normally begin the program in the first semester of the academic year and complete it within a period of twelve months. The program includes a 6-hour seminar which is scheduled between the spring and summer terms. A grade-point average of 3.0 is required for graduation.

There is no thesis requirement. A number of courses and seminars within the program, however, require substantial research papers.

Tool Requirement. Candidates for the degree must demonstrate basic competence in one of the following: accounting, statistics, or computer science.

This requirement may be satisfied by the successful completion of an approved undergraduate or graduate course at WVU or another academic institution approved by the student's adviser. But this requirement need not be completed before entrance into the MPA program. It may also be satisfied by the passing of an examination in the tool chosen.

Final Qualifying Examination. During the last term of study, students in the MPA program take a final qualifying examination for the degree. This examination focuses on the core subjects of the program and their interrelationships.

Admission Requirements. Candidates for the program should have a bachelor's degree from an accredited college and a grade-point average of at least 2.5. A strong background in the social sciences is urged. In addition, the results of the Graduate Record Examination (both aptitude and advanced scores) and the recommendations submitted should be supportive of admission.

The application procedure involves:

1. Providing to the Director of Admissions the following: (a) A completed Application for Admission to the Graduate School, WVU; (b) Transcripts.
2. Providing to Director of the Public Administration Program the following: (a) Three letters of recommendation (suggested forms available from Director); (b) Graduate Record Examination scores (both the aptitude test and an advanced test).

In the case of practicing administrators, a record of accomplishment in administrative performance will be weighed heavily in combination with the criteria outlined above.

Students applying for the first semester should have all application materials submitted no later than *March 15*. Notification on admission status takes place around April 1. Students applying for the second semester should have all application materials submitted no later than *October 15*. Notification on admission status takes place around November 1.

Applications for assistantships may be obtained from Room 208, Woodburn Hall.

Public Administration

Pub. Adm.

341. *Administrative Organization and Management*. I, II. 3 hr. PR: Pol. Sci. 140 or consent. Governmental administrative organization and reorganization and of such management functions as leadership, planning, coordination, public relations, and management improvement.
343. *Public Personnel Administration*. I, II. 3 hr. PR: Pol. Sci. 140 or consent. Public personnel administration with particular attention to the merit system concept, career staffing, classification and salary administration, selection, manpower utilization, training, the rights and duties of employees, and the relationship between management and personnel specialists. Emphasis on psychological and human relations aspects of the work situation with attention to role and status, motivation, leadership, employee relations, and supervisor-subordinate interaction.
345. *Public Administration and Policy Development*. I. 3 hr. PR: Pol. Sci. 140 or consent. Policy development examined in terms of the political process, specific policy cases, alternative "futures" analyses and policy science.
403. *Internship*. I, II. 3-9 hr. per sem.; students may enroll more than once. PR: Consent. A work internship in government or political agencies designed to give students actual experience in a particular field of political science or public administration.
439. *Administrative Justice*. I. 3 hr. PR: Pol. Sci. 140 or consent. Analysis of adjudicative machinery and concepts of justice in American public administration. The focus is upon conflict between systems of individual and social justice, and the control of administrative discretion in the service of democratic ideals and equity.
- 440, 441. *Directed Reading and Research in Public Administration*. I, II. 2-4 hr. per sem.; students may enroll more than once. PR: Pol. Sci. 140 or consent.
442. *American Administrative Systems and Processes*. I. 3 hr. PR: Pol. Sci. 140 or consent. Analysis of the nature and processes of American public administration (political, legal, economic, and social conditions) followed by a survey of organization, planning, budgeting, and personnel as the basic elements of an administrative system.
443. *Public Financial Administration*. I. 3 hr. PR: Pol. Sci. 140 or consent. An examination of the principal subjects of financial administration and their interrelationships. Particular attention is given to revenue systems, treasury and debt management, financial controls and intergovernmental fiscal relations.
444. *Public Program Planning*. II. 3 hr. PR: Pol. Sci. 140 or consent. A study of the design and management of governmental administrative systems. Special attention is given to systems theory, methods of system analysis, communications, management controls and methods of program evaluation.
445. *Public Budget Formulation and Execution*. I, II. PR: Pol. Sci. 140 or consent. The budget as a focus of policy formulation and an instrument of controlling the work program. The process of budget creation and administration. The form of the budget. Budgetary practice in American governments.
446. *Public Program Seminar*. S. 6 hr. PR: Advanced standing in the MPA Program. An analysis through case studies of the application of administrative processes to a major public problem. Students in the course are expected to produce substantial research papers on selected public problems.
447. *Applied Research in Public Administration*. I, II. 3 hr. PR: Pol. Sci. 140 or consent. The scientific method applied to public management and public organizational behavior; formulating and testing hypotheses applicable to applied public policy questions; techniques for collecting data; problems and measurement of social variables; interpreting research results.

448. *Legal Environment of Public Administration*. I, II. 3 hr. PR: Consent. This course (1) explores the constitutional-legal basis of public administration in the United States; (2) acquaints the student with the legal profession, legal materials, and legal reasoning; (3) provides training in legal research, case preparation and advocacy; (4) conveys knowledge of administrative law and processes; and (5) provides information on the legal and ethical responsibilities of government administrators as individuals.
449. *Seminar in Public Administration*. II. 3 hr. PR: Consent.
491. *Advanced Study*. I, II. 3 hr. PR: Pol. Sci. 140 or consent. The focus of this course will be depending on those subjects of most topical concern in public administration.
499. *Colloquium*. I, II. 1 hr. Enrollment is limited to students participating in the M.P.A. Program.

RELIGIOUS STUDIES PROGRAM

290. *Seminar: Selected Topic*. I or II. 3 hr. PR: A previous Religious Studies course or consent.
291. *Seminar: Selected Topic*. I or II. 3 hr. PR: A previous Religious Studies course or consent.

SOCIOLOGY AND ANTHROPOLOGY

The Department of Sociology and Anthropology offers a program of study leading to the Master of Arts degree (M.A.) in sociology. This degree provides three somewhat distinct career alternatives: (1) For those interested primarily in an academic career, there is the option of continuing graduate work in a doctoral program at another university; (2) For those who do not plan to go on for a Ph.D., there is the opportunity of teaching at the junior college and community college level; (3) The student is prepared to do applied research, program planning, and program evaluation for community health centers, juvenile courts, alcohol and drug abuse programs, and a wide variety of state and local agencies.

Admission. Applicants for admission to graduate study must have an adequate undergraduate preparation in sociology or make up the deficit during a probationary period. Applicants are required to submit both the aptitude and the advanced scores of the Graduate Record Examination. Three letters of recommendation are required. Foreign students for whom English is not the native language are ordinarily admitted on probationary status. They may be eligible for reclassification after completing one semester of satisfactory work in the department. Applications must be completed by June 15 for admission to the first semester and by September 15 for admission to the second semester. Applications for assistantships must be completed by March 15 for admission to the first semester. Application and assistantship forms may be obtained by writing directly to the department.

Course Requirements. Students who have not had a course in sociological theory, research methods, or statistics as part of their undergraduate work are generally required to take S.A. 201, 211, and Stat. 101 or 311 in their first semester. All candidates for the M.A. degree are required to take S.A. 322, 331, and Stat. 311 and must complete a minimum of 30 hours of coursework plus 6 hours of thesis credit. No more than 12 hours may be at the 200 level. With the written consent of the adviser, up to 6 hours of course credit may be taken in other departments.

Thesis. A thesis is required of all candidates. The student registers for 6 hours of S.A. 394 which will apply to the 36-hour course requirement. A formal thesis proposal must be submitted to the department and a thesis adviser and committee will be appointed. The candidate is expected to defend the thesis in a final oral examination.

Additional information regarding the M.A. program may be obtained by writing the Chairman, Department of Sociology and Anthropology.

The Department of Sociology and Anthropology, in cooperation with the WVU Office of Publications, publishes the Rural Sociological Society's *Mono-graph Series*.

Sociology and Anthropology

S.A.

201. *Sociological Theory.* I, II. 3 hr. PR: S.A. 1, 5, or 7. Systematic analysis of major sociological theories viewed from historical perspective and in terms of current research.
202. *Behavioral Sociology.* I, II, S. 3 hr. PR: S.A. 1, 5, or 7. Sociological principles and methods in the study of individual and group behavior. Social interaction, power and influence, conformity, attitude change, role behavior, social perception, and socio-linguistics.
203. *Collective Behavior.* I or II. 3 hr. PR: S.A. 1, 5, or 7. Analysis of riots, demonstrations, crowd and mob behavior, and other forms of social contagion, and a study of behaviors following natural disasters and social unrest.
204. *Complex Organizations.* I or II. 3 hr. PR: S.A. 1, 5, or 7. The structure and functioning of large-scale, bureaucratic organizations, including studies of industrial organizations, prisons, hospitals, government bureaus, and the military in contemporary society.
205. *Inequality and Society.* I, II. 3 hr. PR: S.A. 1, 5 or 7. Analysis of various systems of social inequality. Emphasis on empirical studies describing social class system, distribution of status and power, and patterns of social mobility in America.
211. *Social Research Methods.* I, II. 3 hr. PR: S.A. 1, 5, or 7. Logic of social research, elements of research design, and problems of measurement, with emphasis on survey research methodology and data analysis.
221. *Sociology of Childhood.* I or II. 3 hr. PR: S.A. 1, 5, or 7. Theory and research on socialization processes in the family, peer group, and community, including comparative study of child-rearing practices among different regions, social classes, and ethnic groups.
222. *Principles of Community Development.* I. 3 hr. PR: S.A. 1, 5, or 7. Application of sociological knowledge of structure of communities for planning programs and services. Emphasis on techniques of organizing efforts for community change.
223. *Sociology of Rural Life.* I or II. 3 hr. PR: S.A. 1, 5, or 7. Social aspects of rural living. Characteristics of rural population, social structure, and institutional arrangements: family, community, education, religion, recreation, health, welfare, and local government.
224. *World Societies in Transition.* I or II. 3 hr. PR: S.A. 1, 5 or 7. Comparative study of major change processes and future trends in societies in various stages of industrialization.
231. *Society and Health.* I. 3 hr. PR: S.A. 1, 5, or 7. Health and illness behavior and the social organization of the health professions, including the problems of health-care delivery systems in the United States and in developing areas.

232. *Sociology of Education*. I or II. 3 hr. PR: S.A. 1, 5, or 7. Education as a social institution, cultural and class influences on education, social roles and career patterns in the school system, the school and problems of the community.
233. *Industrial Sociology*. I or II. 3 hr. PR: S.A. 1, 5, or 7. Cross-cultural studies of work and of the structure and functioning of industrial organizations.
240. *Social Change*. I or II. 3 hr. PR: S.A. 1, 5, or 7. Sociological analysis of current major changes in our society, of the forces underlying them, and of tensions to which they give rise. Alternative future directions; rational manipulation and planning for social change.
241. *Population Dynamics*. I or II. 3 hr. PR: S.A. 1, 5, or 7. Demographic analysis focusing on social causes and consequences of variations in fertility, morbidity, mortality, and migration. National and state population policies also considered.
245. *Soviet Society*. I. 3 hr. PR: S.A. 1, 5, or 7. Social and cultural trends in contemporary Soviet Union. Population characteristics and ethnic and nationality diversity; the family, education, political institutions and social classes; agricultural, industrial, and scientific organization. Comparisons with U.S. society.
250. *Comparative Peasant Societies*. II. 3 hr. PR: S.A. 1, 5, or 7. Economic and social conditions in traditional peasant societies. Materials drawn primarily from Latin America and Mediterranean Europe.
251. *Cultural Dynamics*. I. 3 hr. PR: S.A. 1, 5, or 7. Nature of culture and how it changes, including natural environmental changes, culture-contact, economic and population pressures.
252. *Culture and Personality*. I, II. 3 hr. PR: S.A. 1, 5, or 7. How different cultures shape the personalities of their members; concepts such as modal personality and national character.
255. *Anthropological Theory*. I. 3 hr. PR: S.A. 1, 5, or 7. Theoretical contributions of anthropology to the social sciences. Key figures of modern anthropology, i.e. Boas, Malinowski, and Mead.
256. *Field Methods in Cultural Anthropology*. II. 3 hr. PR: S.A. 211 or consent. The distinctive craft of data gathering in cultural anthropology. Development skills in field methods and participant observation.
257. *Primate Behavior*. (Same as Biology 235). I. 3 hr. PR: 3 hr. of other behavioral science or consent. Primates as they exist in their natural habitats suggest clues to early human behavior and evolution of behavior. Case studies and comparative behavior from prosimians, monkeys, and apes to human hunters and gatherers.
260. *Social Structure and Personality*. I or II. 3 hr. PR: S.A. 1, 5, or 7. Interaction between society and the individual's behavior. Key concepts are social role, and the social self. Focus on adult experiences and adult socialization.
261. *Police, Courts and Corrections*. I or II. 3 hr. PR: S.A. 132 or 133. America's criminal justice system within an interest group perspective. Police corruption and brutality, due process and individual rights, victimless crime, bail, jail reform, and abolition of prisons.
290. *Special Topics*. I, II, S. 3 hr. PR: S.A. 1, 5, or 7. A seminar primarily for department majors on issues and problems of current concern.
291. *Honors Seminar*. I, II. 3 hr. PR: Honors standing in sociology. A seminar on a topic of importance in sociology and anthropology.
293. *Independent Study*. I, II, S. 1-3 hr. per sem. PR: 3.0 grade-point average and written departmental permission. Directed reading or research for students desiring work not available in regular course offerings.
322. *Contemporary Sociological Theory*. I, II. 3 hr. PR: 9 hr. sociology or consent. Review of recent trends and orientations in sociology. Theory construction, typologies,

mathematical models and the relationship between theory and research. Review of current literature.

331. *Methods of Social Research*. I, II. 3 hr. PR: Stat. 101, 311, or equiv. The research process from conceptualization of the problem to analysis of the data. Sampling, questionnaire construction, measurement, and computer skills in analysis of data.
341. *Demographic Methods and Analysis*. I. 3 hr. PR: 9 hr. sociology or consent. The field of human population focusing on fertility, mortality, and migration. Population policy in relation to economic and social development.
342. *Demographic Patterns in West Virginia*. II. 3 hr. PR: 9 hr. of sociology or consent; S.A. 341 recommended. Population trends in the state in relation to social and economic conditions. Students work intimately with West Virginia census data and vital statistics.
370. *Group Dynamics*. I or II. 3 hr. PR: 9 hr. sociology or consent. Patterning of interpersonal relationships within natural and experimental groups including such topics as communication, attraction, power, group cohesiveness, and coalition formation.
371. *Sociology of Deviant Behavior*. I. 3 hr. PR: 9 hr. sociology or consent. Various theoretical orientations to the study of deviant behaviors including views of causation and behavioral change. The social definitions, stigma, and labels attached to certain behaviors and development of deviant "careers."
372. *Sociocultural Factors in Health, Illness, and Medical Care*. I. 3 hr. PR: 9 hr. of sociology or consent. Distribution of disease in the population and patterns of illness behavior. Sociological study of the health professions, community health care institutions, and the cost and organization of health services.
374. *Applied Behavioral Analysis*. I or II. 3 hr. PR: 9 hr. of sociology or consent. Fundamental concepts of behavioral analysis derived from laboratory and field studies of social behavior. Design and execution of behavioral analysis within applied settings.
375. *Criminal Justice Systems*. I or II. 3 hr. PR: 9 hr. of sociology or consent. Law, police, courts, and correctional organizations as components of inter-related system of criminal justice. Research on discrepancies between theory and practice is reviewed; sociology of law, systems theory and social planning emphasized.
380. *Kinship and Family Structure*. II. 3 hr. PR: 9 hr. of sociology or consent. Cross cultural perspectives on the family institution. The role of kinship networks and the relationship between the family and social class and occupational position.
381. *Social Stratification: Sources and Consequences*. I. 3 hr. PR: 9 hr. of sociology or consent. Socio-economic hierarchies in modern industrial societies from Marxist and functionalist perspectives. Research on mobility, income inequality, educational and occupational attainment, discrimination, and poverty.
390. *Special Topics*. I, II, S. 3 hr. A graduate seminar offered as the need arises. Topics change so students may enroll more than once.
391. *Seminar*. 3-9 hr.
393. *Independent Study*. I, II, S. 2-9 hr. PR: Written departmental consent. Directed reading and/or research in a specialized area of interest.
394. *Thesis*. I, II, S. 1-6 hr.
490. *Teaching and Research Practicum*. I, II. 3 hr. Required of all graduate assistants.

SPEECH COMMUNICATION

Master of Arts

The Department of Speech Communication offers work leading to the Master of Arts degree in communication theory and research. Persons who possess a bachelor's degree from an accredited college or university may be admitted to the program. Qualified graduate students from a variety of disciplines are admitted to the program. The Master of Arts degree is intended to qualify the student to:

1. Assume a variety of professional roles in educational, industrial, governmental, or media institutions.
2. Teach the subject matter in high school and/or college.
3. Undertake advanced training toward a doctorate in the behavioral sciences.

In addition to the general requirements of the Graduate School, the graduate student in speech communication must meet the following departmental requirements:

1. Successful completion of the minimum number of required graduate hours as set forth in Program A or Program B below with a minimum grade-point average of 3.0.
2. Completion of Sp. Com. 401 and 420.

Program A — Thesis Program

All students in the department are encouraged to enter the thesis program. The following is required:

1. At least 36 hours of graduate credit, 30 of which must be in the Department of Speech Communication. A maximum of 6 hours of thesis credit will be allowed.
2. Pursuit of courses in cognate fields upon the advice and approval of the Department Director of Graduate Studies.
3. A thesis.
4. An oral examination on the thesis.

Program B — Non-Thesis Program

1. A minimum of 36 hours of course work with at least 30 in the Department of Speech Communication.

2. Successful completion of written and oral comprehensive examination:
a. Comprehensive examinations draw upon broad course concepts as applied to theoretical and practical problems in communication; b. The content and form of the comprehensive examinations are tailored for the individual student by his advisory committee.

Speech Communication

Sp. Com.

- 201. *Principles of Communication Education*. I, II, S. 3 hr. PR: 15 hr. in department. Literature, principles, and current practices of communication education in public schools with directed application. Intended for teachers in communication and language arts.
- 202. *Directing the Forensic Program*. II, S. 1-3 hr. PR: Sp. Com. 107. Principles and techniques of administering a forensic program, tournament direction, and conducting extracurricular activities.
- 221. *Persuasion*. I, II, S. 3 hr. PR: Sp. Com. 11. Theory and research in persuasion, emphasizing a critical understanding and working knowledge of the effects of social communication on attitudes, beliefs, and behavior.
- 230. *Survey of Rhetorical-Communication Theory*. I. 3 hr. PR: Sp. Com. 11. Theory in the rhetorical communication context with emphasis on periods preceding the twentieth century.
- 231. *Communication and Symbolic Processes*. I, II. 3 hr. Relationships among language, thought, and action. How people use and react to language.
- 275. *Communication Problems of Children*. I, II. 3 hr. PR: Sp. Com. 11. Primarily for elementary and secondary school teachers and language arts supervisors. Normal maturational development of listening and speaking skills, their relationships to language acquisition, and influence upon achievement.
- 281. *Media in Communication and Education*. I, II. 3 hr. Use of the media in educational and other communication environments with emphasis on communication processes and principles relevant to television and film.
- 370. *Psychology of Interpersonal Communication*. II. 3 hr. PR: Consent. Modern psychological principles of speech learning and usage. Influences of emotion, conditioning, and habit formation on listening, thinking, language, and personality factors in oral communication.
- 371. *Theory and Research in Language*. I, II, S. 3 hr. Syntactics, semantics, and pragmatics of language behavior. Analyses of contemporary linguistic theories.
- 372. *Theory and Research in Mass Communication*. I, II, S. 3 hr. Mass communication from a consumer's viewpoint. Use of consumer-oriented mass media research also stressed.
- 373. *Theory and Research in Persuasion*. I, II, S. 3 hr. Various theories and principles of persuasion with emphasis on contemporary research literature.
- 374. *Theory and Research in Diffusion*. I, II, S. 3 hr. Advanced seminar in communication and change in various cultures. Special emphasis on research in diffusion of innovations and special topics such as communication strategies for population control, communication of technical information, etc. in the developing countries.
- 376. *Theory and Research in Organizational Communication*. I, II, S. 3 hr. Contemporary research linking communication variables and networks to organizational change, effectiveness, leadership, power, and management practices. Analysis of communication problems within a variety of organizations.
- 377. *Theory and Research in Small Group Communication*. I, II, S. 3 hr. Specific research areas in interpersonal communication with intensive emphasis on small groups.
- 401. *Introduction to Graduate Study in Human Communication*. I, S. 3 hr. Major emphasis on designing and conducting experimental and laboratory research in human communication. Should be taken first semester of graduate study.

- 402. *Advanced Seminar in Research Methods*. II, S. 3 hr. PR: Sp. Com. 401. Research techniques necessary to conduct original communication research. Emphasis on advanced statistical techniques.
- 420. *Survey of Human Communication Theory*. I, II, S. 3 hr. Broad overview of contemporary theories in communication.
- 433. *Special Topics*. I, II, S. 3-12 hr. PR: Consent. Thorough study of special topics in human communication including interpersonal and small group, language, intercultural, organizational, persuasion, and mass communication, nonverbal communication, and communication education.
- 475. *Independent Study*. I, II, S. 1-3 hr. PR: Consent. Open to graduate students pursuing independent study in communication.
- 496. *Seminar in Human Communication*. I, II, S. 3-9 hr. Current problems and research in human communication.
- 497. *Research*. I, II, S. 1-15 hr.
- 499. *Thesis*. I, II, S. 3-6 hr.

STATISTICS AND COMPUTER SCIENCE

The Department of Statistics and Computer Science offers a Master of Science degree with a major in Statistics and a Master of Science degree with a major in Computer Science. The Master of Science degree is intended to qualify the student to: (1) Assume a professional role in an educational, industrial, or government research project; (2) Teach in a junior or senior college, or (3) Undertake advanced training toward a doctorate in one of the quantitative fields of science.

To obtain a Master of Science degree in Statistics or Computer Science a minimum of 36 hours of graduate coursework is required. Because, however, many students received baccalaureate degrees from colleges which do not offer undergraduate programs in either statistics or computer science, they may lack certain prerequisite courses. Those lacking prerequisite courses may find it necessary to take coursework in addition to the required 36 hours; such additional work may include lower-division courses for which graduate credit cannot be given.

Students are encouraged to request a written examination over foundation material during the first three weeks of the semester in which they hope to graduate. All written examinations will be given during the last month of the semester in which they are requested. The final oral exam, for those students passing a written examination over foundation material, will have less emphasis on coursework. Courses that contain foundation material are listed under each program.

Statistics

A minimum of 18 hours in statistical methods, applications, and theory are required. Additional graduate-level courses will consist of elective courses in statistics or computer science, supporting mathematics courses, or approved courses in a specific field to which the candidate may wish to apply statistical knowledge.

A problem report also is required. As much as 3 hours credit in research can be given for the report and applied toward the supporting coursework.

Requirements for an M.S. in Statistics:

1. Six hours of statistical methods (Stat. 311, 312, 333, 341, 351).
2. Six hours of statistical theory (Stat. 361 and 362).
3. Six hours of applied statistics (Stat. 321, 333, 341, 342, 351, 452.)
4. Three hours of credit for a problem report or 6 hours credit for a thesis (Stat. 497).
5. Supporting coursework (12-15 hr.).
6. A final oral examination over the problem report or thesis and coursework. Foundation material for the written examination is contained in Stat. 312, 321, 333, 341, 351, 361, and 362.

Statistics

Stat

201. *Intermediate Statistical Methods*. II. 3 hr. PR: Stat. 101. Extension of basic concepts of statistical models, elementary decision theory, estimation, random variable, one- and two-way classification models, analysis of variance, F-distribution, linear regression and correlation analysis. (Equiv. to Econ. 226.)
215. *Statistical Computer Techniques*. II. 3 hr. PR: A programming language, PR or Conc. Stat. 201 or equiv. Generating random numbers and tests for randomness. Elementary simulations, estimations, and tests of hypotheses. Computational algorithms and interpretation of data using analysis of variance, regression, and multivariate analysis.
223. *Applied Matrix Algebra*. I. 3 hr. PR: Math. 18 or 51. Elementary matrix concepts and operations, vector spaces, characteristic roots and vectors, generalized inverses, systems of linear equations, patterned matrices, orthogonal and other special matrices. (Equiv. to C.S. 223 and Math. 223.)
231. *Sampling Methods*. I. 3 hr. PR: Introductory course in statistics. Methods of sampling from finite and infinite populations, choice of sampling unit, sample survey design, estimation of confidence limits and optimum sample size, and single and multi-stage sampling procedures.
261. *Statistics and Probability 1*. I. 3 hr. PR: Math. 16. Probability, discrete and continuous probability distributions, expectations, sums of random variables, sampling distributions, point and interval estimation, tests of hypotheses.
262. *Statistics and Probability 2*. II. 3 hr. PR: Stat. 261. Statistical inference and decision theory; properties of hypotheses; bivariate and multivariate distributions; least squares procedures.
291. *Special Topics*. I, II, S. 1-6 hr. Advanced study of special topics in statistics.
311. *Statistical Methods 1*. I, II. 3 hr. PR: Math. 3. Statistical models, distributions, probability, random variables, tests of hypotheses, confidence intervals, regression, correlation, transformations, F and Chi-square distributions, analysis of variance and multiple range tests. (Equiv. to Ed. Psych. 311 and Psych. 311.)
312. *Statistical Methods 2*. I, II. 3 hr. PR: Stat. 201 or 311. Extension of basic concepts of statistical models, design of experiments, multiway classification models, factorials, split plot design, simple covariance, orthogonal comparisons, multiple linear and non-linear regressions and correlation analysis. (Equiv. to Ed. Psych. 312 and Psych. 312.)
321. *Design of Experiments*. I. 3 hr. PR: Stat. 312. Design and analysis of experiments over time and space, fractional replications, incomplete block designs, cross-over designs, lattice designs, and least squares analysis for unequal subclass numbers.

333. *Nonparametric Statistics*. II. 3 hr. PR: An introductory course in statistics. Single sample tests; tests for related samples, two independent samples, k related samples, K independent samples; and measures of correlation.
341. *Multivariate Methods 1*. I. 3 hr. PR: Stat. 201 or 311. Introduction to elementary matrix operations, partial and multiple linear and non-linear correlation and regression analysis, and introduction to discriminant analysis.
342. *Multivariate Methods 2*. II. 3 hr. PR: Stat. 341. Multivariate normal distribution, tests of hypotheses about the sample mean vectors and variance-covariance matrices from a multivariate normal distribution, and analysis of variance of multiple responses in basic statistical designs.
351. *Applied Regression Analysis*. I. 3 hr. PR: Stat. 312. Matrix approach to linear and multiple regression, selecting the "best" regression equation, model building, and linear models approach to analysis of variance and analysis of covariance.
361. *Theory of Statistics 1*. I. 3 hr. PR: Math. 51. Probability and random variables, univariate and multivariate probability distributions, expectations, moments, marginal and conditional distributions, independence, correlation, transformations, and functions of random variables.
362. *Theory of Statistics 2*. II. 3 hr. PR: Stat. 361. Estimation including bias, consistency, efficiency and sufficiency, hypothesis testing, distribution-free problems, order statistics, linear models and analysis of variance, and special distributions.
371. *Introduction to Exploratory Data Analysis*. I. 3 hr. PR: Stat. 311 or consent. Basic ways in which facts or observations given in counted or measured form are approached. Pictorial and arithmetic techniques of display and discovery, supplemented by a special computer package. Applications to social and natural sciences.
446. *Factor Analysis*. II. 3 hr. PR: Stat. 341. Alternative methods for factor extraction, communalities, rotation in orthogonal and oblique space, and estimation of factors scores. (Equiv. to Psych. 416.)
452. *Linear Models*. S. 3 hr. PR: Stat. 351 and 362. Multivariate normal distribution, distribution of quadratic forms, linear models, general linear hypotheses, experimental design models, components of variance for random effects models.
490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Supervised practices in college teaching of statistics.
491. *Advanced Studies in Statistics*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced statistics subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. It is anticipated that each graduate student will present at least one seminar to the assembled faculty and student body in statistics.
497. *Research in Statistics*. I, II, S. 1-15 hr. PR: Consent.

Computer Science

A minimum of 36 semester hours of graduate credit is required and at least 18 hours must be in computer science. Students with a baccalaureate degree in computer science are expected to take a unified minor consisting of at least 9 hours in another discipline.

Requirements:

1. 18 hours of computer science.
2. Six hours of mathematics or statistics. Students are encouraged to take two of the following three courses: Stat. 311 and 312, and Stat. 351.

3. Three hours of credit for a problem report or 6 hours of credit for a thesis.
4. 6-9 hours of approved supporting coursework.
5. A final oral examination over the problem report or thesis and coursework.

Foundation material for the written examination is contained in C.S. 310, 330, 340, 350, and 360.

Computer Science

C.S.

220. *Numerical Analysis 1*. I. 3 hr. PR: Math. 16 and C.S. 120 or consent. Solutions of equations, interpolation and approximations. Numerical differentiation and integration. Numerical solution of initial value problems in ordinary differential equations. (Equiv. to Math. 321.)
221. *Numerical Analysis 2*. II. 3 hr. PR: Math. 17 and C.S. 220 or consent. Solutions of linear systems by direct and iterative methods. Matrix inversion, evaluation of determinants, and calculation of eigenvalues and eigenvectors of matrices. Application to boundary value problems in ordinary differential equations. (Equiv. to Math. 322.)
223. *Applied Matrix Algebra*. I. 3 hr. PR: Math. 18 or 51. Elementary matrix concepts and operations, vector spaces, characteristic roots and vectors, generalized inverses, systems of linear equations, patterned matrices, orthogonal and other special matrices. (Equiv. to Stat. 223 and Math. 223.)
230. *Programming Languages*. I. 3 hr. PR: C.S. 51. Formal definition of programming languages including specification of syntax and semantics. Structure of simple statements and algorithmic languages; list processing and string manipulation languages.
240. *Systems Programming*. I. 4 hr. PR: C.S. 51. Software organization for the support of computer components. Addressing techniques process and data modules, file system organization and management. Traffic control and communication with peripheral devices.
241. *Systems Programming*. II. 3 hr. PR: C.S. 240. Memory management; name management; file systems; segmentation; protection; resource allocation; pragmatic aspects in the design and analysis of operating systems.
248. *Programming Small Computers*. II. 3 hr. PR: C.S. 51. Processing of data using small laboratory digital computers.
260. *Information Analysis*. I. 3 hr. PR: Econ. 52, Mgmt. 111, C.S. 51. Information analysis and logical design of a computer system. Exercises and case studies are used to give students proficiency in information analysis techniques. Projects are assigned to provide practical experience in systems development and implementation.
261. *System Design*. II. 3 hr. PR: C.S. 260. Underlying principles of system design and techniques. A theme to be carried throughout the course is the iterative nature of the analysis and design process. Implementation and conversion problems are also considered. Practical projects are assigned to give students experience in actual situations.
291. *Special Topics*. I, II, S. 1-6 hr. PR: Consent. Advanced study of special topics in computer science.
301. *Computers in Research 1*. I, S. 3 hr. The use of computers in research. Organization and characteristics of computers. Algorithms, machine language programming, scientific oriented language programming subprograms, program segmentation and

linkage. (Statistics and Computer Science majors should get approval of their graduate committee before taking this course for credit.)

- 302. *Computers in Research* 2. II. 3 hr. PR: C.S. 301. Computer techniques in research. Data retrieval, scientific and business data processing, survey methods. Simulation and simulation languages. Formal definition of programming languages. (Statistics, and Computer Science majors should get approval of their graduate committee before taking this course for credit.)
- 310. *Application Programming*. I. 3 hr. PR: Programming knowledge. Survey of computer application areas by industry, and summary of basic techniques used in computer applications problems, illustrated with real world examples. Options and decisions involved in problemsolving emphasized.
- 311. *Application Programming*. II. 3 hr. PR: C.S. 310 or consent. Continuation of C.S. 310 where students work on a particular project under supervision of a faculty member and present a written and oral report on their project.
- 320. *Numerical Solution of Linear Equations*. 3 hr. PR: C.S. 120 or consent. Numerical solution of large systems of linear equations using direct and iterative methods. Calculation of inverses and generalized inverses of matrices. Numerical methods for the determination of eigenvalues and eigenvectors.
- 330. *Design of Language Processors*. II. 3 hr. PR: C.S. 230. Study of the design and construction of automatic programming language processors. Investigation of the structure of scientific and business oriented compilers, list processors, and information processing languages.
- 340. *Design of Programming Systems*. II. 3 hr. PR: C.S. 241. Design of monitor systems, executive systems and operating systems for high speed digital computers. Emphasis placed on current generation computers with multiprogramming, interactive, teleprocessing, and real time capabilities.
- 341. *Computer Systems*. II. 3 hr. PR: C.S. 340 and Stat. 312, or consent. Simulation, evaluation, and measurement of computer systems. Techniques of measurement and evaluation using hardware and software monitors, methods of model validation, and creation of management reports.
- 360. *Design of Data Base Systems*. I. 3 hr. PR: C.S. 260. Data base systems from standpoint of design, evaluation, implementation, and use. Theoretical as well as practical considerations emphasized. Includes existing systems as well as design of entirely new systems.
- 490. *Teaching Practicum*. I and II. 1-3 hr. PR: Consent. Supervised practices in college teaching of computer science.
- 491. *Advanced Studies in Computer Science*. I, II, S. 3-6 hr. PR: Consent. Investigation in advanced computer science subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
- 496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and student body in computer science.
- 497. *Research in Computer Science*. I, II, S. 1-15 hr. PR: Consent.



William H. Miernyk, Benedum professor of economics, conducts a seminar.

College of Business and Economics

The College of Business and Economics offers graduate programs in business administration, economics, and industrial relations.

The program in business leads to the degree of Master of Business Administration (M.B.A.). This program is supervised by the graduate faculty in business administration and the students in business are administered by the director of graduate programs in business.

Graduate programs in economics lead to the degrees of Master of Arts (M.A.) and Doctor of Philosophy (Ph.D.). These programs are supervised by the graduate faculty in economics and the students are administered by the director of graduate programs in economics.

The program in industrial relations leads to the degree of Master of Science. This program is supervised by the graduate faculty in business and economics and the students are administered by the director of graduate programs in industrial relations.

All work for a graduate degree must be completed within a period of seven years. An extension of this period must be approved in writing by the appropriate graduate faculty and the Dean of the Graduate School.

BUSINESS ADMINISTRATION

To receive approval to enter the M.B.A. program an applicant must have a baccalaureate degree from an accredited college or university with an undergraduate grade-point average of at least 2.5 and a score of 450 on the Admission Test for Graduate Study in Business. Applicants with a baccalaureate degree, an undergraduate grade-point average of at least 2.25 but less than 2.5, and a score of 500 on the Admissions Test for Graduate Study in Business may be approved to enter the program on a probationary basis. To assure that all students in the program have the same foundation in business, the applicant must have completed the following courses or their equivalent:

- Principles of Accounting (two semesters)
- Principles of Economics (two semesters)
- Principles of Marketing
- Principles of Management (or Industrial Management)
- Business Finance
- Principles of Statistics

A student without the necessary prerequisite courses may be approved to enter the M.B.A. program on probation subject to removal of any deficiencies before taking the required graduate courses. Scores on the Admission Test for Graduate Study in Business must be submitted before an applicant can be considered for the M.B.A. program. All applications for approval to enter the M.B.A. program must be received in the WVU Office of Admissions and Records as early as possible and no later than two months before the date for which enrollment is requested.

Master of Business Administration (M.B.A.)

The candidate's program of courses will be planned with the assistance and approval of a faculty adviser. The M.B.A. degree requires 36 hours of graduate credit, including the following courses:

First Semester*

Accounting 301—Managerial Control. 3 hr.
Economics 301—Managerial Economics. 3 hr.
Economics 302—Research and Reports. 1 hr.
Management 301—Administrative Practices. 3 hr.
Management 302—Quantitative Business Analysis. 3 hr.

Second Semester**

Economics 302—Research and Reports. 2 hr.
Finance 313—Financial Administration. 3 hr.
Management 313—Production Administration. 3 hr.
Marketing 313—Marketing Administration. 3 hr.

Summer Session

Management 323—Administrative Policy. 3 hr.***

*PR: The undergraduate courses listed above, or consent.

**PR: The required courses offered in the First Semester, or consent.

***PR: The required courses offered in both the First and Second Semester, or consent.

The candidate also will complete 9 semester hours of elective courses selected with the approval of the adviser, of which at least 3 hours must be in a graduate course of the College of Business and Economics at the 300 level, preferably in a graduate seminar in business. No thesis is required, but writing is emphasized in all courses.

The M.B.A. program requires that the student maintain a grade-point average of at least 3.0 (B) on all work taken as a graduate student while enrolled in the College, including prescribed work taken to remove undergraduate deficiencies. A student whose cumulative grade-point average falls below 2.75 will be placed on probation. If the average is not brought up to 2.75 by the end of the following semester, the student will be suspended from this program. A grade below C in any course taken while enrolled as a graduate student will result in suspension from this graduate program. In addition, the student must maintain a 3.0 (B) average in all work counting toward the graduate degree.

Complete and detailed information about the M.B.A. program may be obtained by securing a copy of the M.B.A. bulletin from the Director of Graduate Programs in Business.

ECONOMICS

All applicants must take both the general aptitude test and the economics advanced test of the Graduate Record Examination. Before admission to the program, students are required to have completed at least 18 semester hours of course work in economics. Six of these hours may be in principles of economics, at least 3 hours must be in statistics, and not more than 3 hours may be from the functional fields of accounting, finance, marketing, management, etc. A minimum grade of C is required in each of the courses taken to meet the 18-hour

economics requirement. Applicants must have a 2.5 grade-point average or better for all undergraduate work completed.

Students who do not meet these entrance requirements may be admitted on probation subject to the correction of the deficiencies at the beginning of the program. Deficiencies in undergraduate preparation must be removed without graduate credit. No student will be admitted on probation unless the student's grade-point average is at least 2.25.

To qualify for the master's degree, graduate students in economics must earn a cumulative grade-point average of 2.75 in all courses attempted during their tenure as graduate students at WVU. To qualify for the Ph.D. degree, graduate students in economics must earn a cumulative grade-point average of 3.0. A student whose cumulative grade-point average falls below 2.75 will be placed on probation. If the student's average is not brought up to 2.75 by the end of the following semester, the student will be suspended.

Master of Arts (M.A.)

The candidate's program of courses will be planned with the assistance of the faculty adviser and must have the adviser's approval. The M.A. degree requires a total of 30 semester hours of graduate credit, including:

- (1) Economics 310—Advanced Micro Theory I. 3 hr.
Economics 312—Advanced Macro Theory I. 3 hr.
- (2) Economics 316—History of Economic Doctrines and Analysis. 3 hr.
If the student has successfully completed Economics 216—History of Economic Thought or its equivalent before entering the graduate program, any 300 level economics course may be substituted.
- (3) An additional 6 semester hours of 300 level courses and 3 semester hours of either 200 or 300 level economics courses. No more than 6 semester hours of the electives, both 200 or 300 level, stipulated under (2) and (3) may be taken in the same field of specialization.
- (4) a. An acceptable thesis, 6 hr. b. The following may be substituted for a thesis in meeting the requirements for the M.A. degree in economics: (a) completion of 6 additional semester hours in one field of concentration in economics; (b) the passing of a written comprehensive examination in one field of concentration in economics; and (c) a research paper that gives evidence of substantial ability to conduct scholarly research.

Students must also pass a qualifying examination in statistics and quantitative methods. A minimum grade of C in Advanced Statistics (Econ. 226 or its equivalent) and Introduction to Quantitative Analysis (Econ. 220) may be substituted in lieu of these qualifying examinations.

Doctor of Philosophy (Ph.D.)

At least three years of full-time graduate work beyond the baccalaureate degree are usually required to qualify for the doctorate. Two of the three years of residence must be at WVU, including at least two consecutive semesters in actual residence as a full-time graduate student.

The Ph.D. degree is not awarded for the mere accumulation of course credits nor for the completion of the specified residence requirements. A minimum, however, of 36 hours of graduate work in economics at the 300 level is

required for all candidates for the Ph.D. degree in economics. These must include 18 hours in the graduate core curriculum in economics, which include:

Economics

- 310—Advanced Micro Theory I. 3 hr.
- 311—Advanced Micro Theory II. 3 hr.
- 312—Advanced Macro Theory I. 3 hr.
- 313—Advanced Macro Theory II. 3 hr.
- 316—History of Economic Doctrines and Analysis. 3 hr.
- 320—Quantitative Analysis. 3 hr.

Six additional hours must be taken at the 300 level in each of the candidate's fields of concentration other than economic theory. The remaining hours will be selected by the student with the aid of the student's adviser.

For admission to candidacy for the Ph.D. the student must:

1. Satisfy the foreign language requirement of the Graduate School.
2. Demonstrate proficiency in statistical technique by successful completion of a qualifying examination or, alternatively, by achieving a minimum grade of B in Advanced Statistics (Econ. 226 or equivalent courses.)
3. Successfully complete preliminary examinations in four fields which include economic theory, two other fields of concentration in economics, and one other field in economics or in an outside area. The selection of an outside field must be done with the advice and consent of the graduate director.

When an applicant has successfully passed the qualifying examinations, the applicant will be formally promoted to candidacy for the doctoral degree.

The candidate must submit a thesis pursued under the direction of the graduate faculty in economics on some problem in the area of the candidate's major interest. The thesis must present the results of the candidate's individual investigation and must embody a definite contribution to knowledge. It must be approved by a committee of the graduate faculty in economics. After approval of the candidate's thesis and satisfactory completion of other graduate requirements, a final oral examination on the thesis is required.

INDUSTRIAL RELATIONS

Applicants for admission must have a baccalaureate degree from an accredited university or college with a minimum of 21 hours of undergraduate work in the social sciences, including at least 3 hours in statistics and 3 hours in labor economics. The social sciences are interpreted to include economics, history, political science, psychology, sociology/anthropology, and general social science. In addition to the course requirements, applicants must have a 2.5 grade-point average in undergraduate work. Applicants with a baccalaureate degree and an undergraduate grade-point average of at least 2.25 but less than 2.5 may be approved to enter the program on a probationary basis. Students who do not have the necessary undergraduate courses may be admitted as probationary students, but undergraduate deficiencies must be removed in the first semester of residency without graduate credit.

To receive the master of science degree, the candidate may select either a thesis or a non-thesis program. The non-thesis program requires 36 hours of graduate work which will include the following 18 hours of required courses:

- Economics 262—Collective Bargaining. 3 hr.
- Psychology 201—Personnel Psychology. 3 hr.
- Sociology 233—Industrial Sociology. 3 hr.
- Statistics 311—Statistical Methods. 3 hr.
- Industrial Relations 430—Two seminars in Industrial Relations. 3 hr. each

The remaining hours will be chosen from the following courses after consultation with the adviser. While the listed courses are preferred, considerable latitude may be given the student by the adviser to choose other courses which are particularly appropriate to the student's background and interest. Approval must be obtained in advance. To receive the master's degree at least 60 percent of a graduate student's courses must be numbered at the 300-level and above.

<i>Industrial Engineering</i>	<i>Hr.</i>	<i>Economics</i>	<i>Hr.</i>
220—Theo. Ind. Eng'g. & Org.	3	211—Micro. Econ. Anal.	3
222—Job Eval. and Wage Incent.	3	212—Macro. Econ. Anal.	3
260—Human Factors Eng'g.	3	260—Manpower Econ.	3
280—Ind. Eng'g. Prob.	1-3	263—Economics of Wages	3
358—Ind. Eng'g. for Ind. Rels.	3	360—Adv. Labor Econ.	3
<i>Psychology</i>		364—Seminar, Labor Econ.	3
304—Leadership and Human Rel.	3	390—Readings in Econ.	1-3
307—Prac. Indust. Interview.	3	<i>Law</i>	
313—Directed Studies.	1-3	371—Labor Law	3
<i>Management</i>		<i>Rehabilitation Counseling</i>	
216—Personnel Management	3	320—Vocational Development	
225—Business Policy	3	and Occupational Choices	3
301—Administrative Practice.	3	<i>Sociology and Anthropology</i>	
<i>Public Administration</i>		203—Collective Behavior.	3
341—Adm. Org. and Man.	3	204—Complex Organizations	3
343—Public Personnel Adm.	3	<i>Statistics</i>	
440-441—Dir. Read. in Pub. Adm.	2-4	312—Statistical Methods 2	3

The thesis program requires 30 hours of graduate work which will include the 18 hours of required courses; 6 hours of Industrial Relations 497—Thesis; and 6 hours of approved electives. An average of 3.0 must be maintained in courses taken before the thesis.

The industrial relations program requires that the student maintain a grade-point average of at least 3.0 on all work taken as a graduate student while enrolled in the College, including prescribed work taken to remove undergraduate deficiencies. A student whose cumulative grade-point average falls below 2.75 will be placed on probation. If the student's average is not brought up to 2.75 by the end of the following semester, the student will be suspended from the program. A grade below C in any course taken while enrolled as a graduate student will result in suspension from this graduate program. In addition, the student must maintain a 3.0 average in all work counting toward the graduate degree.

In addition to the above traditional specialization, the student can receive the master of science degree with a specialization in manpower planning and evaluation. This is joint specialization between the College of Business and Economics and the School of Social Work. The student takes 36 hours of graduate work from the above courses and from selected courses in the School of Social Work; moreover, the student must complete a two-semester field placement (internship). The student selects the 36 hours after consultation with, and with the approval of, the student's adviser.

Accounting

Acctg.

- 200. *Special Topics*. I, II, S. 1-4 hr. PR: Acctg. 112 or consent. Special topics relevant to accounting. Maximum of 9 semester hours in any or all courses numbered 200 offered by the College may be applied toward bachelor's and master's degrees.
- 211. *Accounting Systems*. I. 3 hr. PR: Acctg. 112. Adaptation of accounting procedures to demands of firms. Emphasis on use of quantitative tools, use of computers in accounting, the systems concept, and human behavioral implications of accounting.
- 213. *Income Tax Accounting*. I. 3 hr. PR: Acctg. 112 or consent. Tax theory and practice as developed from the Internal Revenue Code, regulations, rulings and court decisions; problems in preparation of tax returns for individuals, partnerships, and corporations.
- 214. *Income Tax Accounting*. II. 3 hr. PR: Acctg. 213. Continuation of Acctg. 213 with emphasis on assessments, refunds, reorganizations, personal holding companies, and federal estate and gift taxes.
- 216. *Advanced Cost Accounting*. II. 3 hr. PR: Acctg. 115. Advanced work in the application of cost theory and procedures to cases and problems which emphasize the managerial use of cost information.
- 217. *Auditing Theory*. I or II. 3 hr. PR: Acctg. 112. Auditing fundamentals; objective standards and procedures; introduction to working-paper techniques; procedure statements of the American Institute of C.P.A.'s.
- 218. *Auditing Practice*. I or II. 3 hr. PR: Acctg. 217. Application of auditing theory and procedures, with emphasis on decisions which invoke judgment and are important in independent audits; audit working papers and reports; case studies.
- 224. *Advanced Accounting Problems*. I or II. 3 hr. PR: Minimum of 18 hr. in accounting with an average grade of B or higher. Analysis and solution of representative C.P.A. problems.
- 230. *Advanced Accounting Theory*. I or II. 3 hr. PR: Acctg. 112, 115 and consent. Critical analysis of accounting concepts and standards with emphasis on their origin, development, and significance.
- 301. *Managerial Control*. I. 3 hr. PR: Acctg. 52 and Econ. 125. Use and significance of quantitative techniques of accounting, statistics, and budgeting for planning, control, and decisionmaking.
- 329. *Seminar in Accounting*. I or II. 3 hr.
- 497. *Research*. I, II. 1-15 hr.

Economics

Specialized Courses

Econ.

- 200. *Special Topics*. I, II, S. 1-4 hr. PR: Econ. 52 or 54 or consent. Special topics relevant to economics. Maximum of 9 semester hours in any or all courses numbered 200 offered by the College may be applied toward bachelor's and master's degrees.
- 205. *Current Economic Problems*. S. 3 hr. PR: Econ. 52 or 54 or consent. For students in education only. Acquaints school teachers with reliable source material in economics and instructs them in studying current economic problems.
- 265. *Economics of Social Security*. I or II. 3 hr. PR: Econ. 52 or 54 or consent. Our social and political efforts to provide economic security, including an examination of parallel developments of private insurance.

301. *Managerial Economics*. II. 3 hr. For students in the M.B.A. program. Analysis of markets and problems of management in appraising business conditions and in adjusting to changes in product demand, costs, level of output, and profits.
302. *Research and Reports*. I, II. 1-3 hr. For students in the M.B.A. program. Sources of business information and research procedures, with application in preparation of reports.

Economic Theory

210. *Comparative Economic Systems*. I or II. 3 hr. PR: Econ. 52 or 54. Structure and processes of economic systems throughout the world including review of basic principles of free enterprise, socialistic, communistic, and fascistic societies. Comprehensive analysis based on current and recent experiments in these economies.
211. *Micro Economic Analysis*. I or II. 3 hr. PR: Econ. 52 or 54. Price and output determination and resource allocation in the firm under various competitive conditions.
212. *Macro Economic Analysis*. I or II. 3 hr. PR: Econ. 52 or 54. Forces which determine the level of income, employment, and output. Particular attention given to consumer behavior, investment determination, and government fiscal policy.
216. *History of Economic Thought*. I or II. 3 hr. PR: Econ. 52 or 54. Economic ideas in perspective of historic development.
310. *Advanced Micro Theory I*. I. 3 hr. Theory of production and allocation, utility theory, theory of the firm, pricing in perfect and imperfect markets, models of firm's operations.
311. *Advanced Micro Theory II*. II. 3 hr. PR: Econ. 310. General equilibrium analysis, distribution theory, welfare economics.
312. *Advanced Macro Theory I*. I. 3 hr. Classical, Keynesian, and Post-Keynesian theories.
313. *Advanced Macro Theory II*. II. 3 hr. PR: Econ. 312. Model of economic growth and fluctuations.
316. *History of Economic Doctrines and Analysis*. I. 3 hr. Writings of the major figures in the development of economic doctrines and analysis.
319. *Seminar in Economics*. II. 3 hr.

Quantitative Economics

220. *Introduction to Quantitative Analysis*. I or II. 3 hr. PR: Econ. 125. Principal mathematical techniques employed in economic analysis; introduction to econometrics.
226. *Advanced Statistics*. II. 3 hr. PR: Econ. 125 or equiv. Advanced approach to statistical analysis with emphasis on probability, inference, and multivariate statistical techniques.
320. *Quantitative Analysis*. II. 3 hr. PR: Econ. 220 or consent. Linear programming, input-output analysis, game theory, decision theory, and dynamic models.
325. *Econometrics*. I or II. 3 hr. Specification, statistical estimation, and verification of economic models. Problems of applications of econometric analysis.
329. *Seminar in Economic Analysis*. I or II. 3 hr.

Monetary Economics

330. *Monetary Economics*. I or II. 3 hr. Sources and determinants of supply of money; demand for money for transactions and speculative purposes; general equilibrium theory of money, interest, prices, and output; role of money in policy.
334. *Seminar in Monetary Economics*. I or II. 3 hr.

Public Finance

- 241. *Public Finance*. I, II. 3 hr. PR: Econ. 52 or 54. Governmental fiscal organizations and policy; taxes and tax systems with particular emphasis on federal government and state of West Virginia.
- 340. *Theory of Public Finance*. I or II. 3 hr. Economic role of government in a mixed economy with regard to resource allocation between public and private sectors, influence of government upon income distribution and economic stability and growth.
- 344. *Seminar in Public Finance*. I or II. 3 hr.

Public Regulation and Control

- 245. *Government and Business*. I or II. 3 hr. PR: Econ. 52 or 54. Government as of adviser and umpire; analysis of governmental policies and practices affecting business.
- 246. *Transportation*. I, II. 3 hr. PR: Econ 52 or 54. Development of an inland transportation system and relations and policies of transport agencies.
- 345. *Public Regulation and Control*. I or II. 3 hr. Economic analysis of the public control of enterprises under the jurisdiction of federal and state regulatory authorities.
- 349. *Seminar in Public Regulation and Control*. I or II. 3 hr.

International Economics

- 250. *International Economics*. I or II. 3 hr. PR: Econ. 52 or 54. Development of trade among nations; theories of trade, policies, physical factors, trends, and barriers in international economics.
- 350. *Advanced International Economics*. I or II. 3 hr. Contemporary theories of international economics; analysis of current problems in world trade and finance.
- 354. *Seminar in International Economics*. I or II. 3 hr.

Regional Economics

- 255. *Regional Economics*. I or II. 3 hr. PR: Econ. 52 or 54. Analysis of factors that promote or deter the economic growth of a region, with emphasis on such matters as population shifts, economic base studies, industrial location analyses, input-output techniques, regional income estimation, local multiplier and cycle concepts, and role of government in regional growth.
- 355. *Advanced Regional Economics*. I or II. 3 hr. Regional income and flow of funds estimation, regional cyclical behavior and multiplier analysis, industrial location and analysis, techniques of regional input-output measurement, impact of local government reorganization on regional public service and economic development.
- 359. *Seminar in Regional Economics*. I or II. 3 hr.

Labor Economics

- 260. *Manpower Economics*. I or II. 3 hr. PR: Econ. 160 or consent. Economics and institutional forces determining the level and composition of labor supply and demand; labor mobility; governmental manpower policies.
- 262. *Collective Bargaining*. I or II. 3 hr. PR: Econ. 160 or consent. Theory and practice of collective bargaining; contract issues, types of relationships, and role of government policy.
- 263. *Economics of Wages*. I or II. 3 hr. PR: Econ. 160 or consent. Determination of wage levels and structure; economic and institutional forces determining wage levels and differentials.

- 360. *Advanced Labor Economics*. I or II. 3 hr. Examination and analysis of our social and economic efforts to solve current manpower problems in the U.S., including structural unemployment and inflation.
- 364. *Seminar in Labor Economics*. I or II. 3 hr.

Economic History

- 270. *Growth of the American Economy*. I or II. 3 hr. Central issues in development of the American economy.
- 370. *Economic History: Regional Economic Development of the United States*. I or II. 3 hr. The regional development of the Pacific Coast, Southwest, Lower South, Old Northwest, and New England.
- 574. *Seminar in Economic History: The Emergence of Modern Europe*. I or II. 3 hr.

Economic Development

- 213. *Economic Development*. I or II. 3 hr. The problems, changes, and principal policy issues faced by non-industrialized countries in economic development.
- 375. *Economic Development*. I or II. 3 hr. Theory, problems, and policy issues relating to economic development.
- 379. *Seminar in Economic Development*. I or II. 3 hr.

Other Economics Courses

- 390. *Independent Reading in Economics*. I or II. 3-6 hr. Supervised readings in special areas.
- 491. *Advanced Study*. I, II. 1-6 hr.
- 497. *Research*. I, II. 1-15 hr.

Finance

Fin.

- 200. *Special Topics*. I, II, S. 1-4 hr. PR: Fin. 111 or consent. Study of special topics relevant to finance. Maximum of 9 semester hours in any or all courses numbered 200 offered by the College may be applied toward bachelor's and master's degrees.
- 216. *Risk Management*. II. 3 hr. PR: Fin. 115 or consent. Transferable risks with which the entrepreneur must deal. Emphasis on the process by which decisions are made for handling these risks, including an examination of contributions and limitations of insurance system.
- 313. *Financial Administration*. II. 3 hr. PR: Fin. 111. Problems in business finance including those related to financial structures of corporations and working-capital and fixed-capital needs of a firm.
- 329. *Seminar in Finance*. I or II. 3 hr.
- 497. *Research*. I, II. 1-15 hr.

Industrial Relations

- 430. *Seminar in Industrial Relations*. I, II. 1-6 hr.
- 491. *Advanced Study*. I, II. 1-6 hr.
- 496. *Graduate Seminar*. I, II. 1 hr.
- 497. *Research*. I, II. 1-15 hr.

Management

Mgt.

- 200. *Special Topics*. I, II, S. 1-4 hr. PR: Mgt. 111 or consent. Special topics relevant to management. Maximum of 9 semester hours in any or all courses numbered 200 offered by the College may be applied toward bachelor's and master's degrees.
- 213. *Problems in Business Administration*. I, II, S. 1-3 hr. Selected management problems related to the total enterprise and the emerging technosstructure, e.g., managerial and corporate strategy, utilization of resources, social responsibility and government relations, dynamics of new industries.
- 216. *Personnel Management*. I, II. 3 hr. Systematic study about leading and motivating people whose work behavior is influenced by technology, organization, and management style as those affect the individual and his work groups. Problems in obtaining, developing, maintaining, and directing human resources for an organization.
- 225. *Business Policy*. I, II. 3 hr. PR: Senior standing and consent. Integrated study of policies, organization, facilities, and control techniques of business enterprises.
- 301. *Administrative Practices*. I. 3 hr. PR: Mgt. 111 or consent. Interpersonal relationships through which administration becomes effective. Emphasis on human factors, but influences of economic and technological factors also are considered. Focus on importance of harmony between individual needs and organizational goals.
- 302. *Quantitative Business Analysis*. I. 3 hr. PR: Econ. 125 or equiv. Review of probability and Bayesian Statistics, multiple correlation, linear programming, and planning and control techniques with an introduction to data processing through computer solution to problems in these areas.
- 313. *Production Administration*. I. 3 hr. PR: Mgt. 111. Review and application of analytical techniques to complex manufacturing problems.
- 323. *Administrative Policy*. II. 3 hr. PR: Consent. An integrated study of policies, organization, facilities, and control techniques of business enterprises.
- 329. *Seminar in Management*. I or II. 3 hr.
- 497. *Research*. I, II. 1-15 hr.

Marketing

Mkt.

- 200. *Special Topics*. I, II, S. 1-4 hr. PR: Mkt. 111 or consent. Special topics relevant to marketing. Maximum of 9 semester hours in any or all courses numbered 200 offered by the College may be applied toward bachelor's and master's degrees.
- 210. *Industrial Purchasing*. I. 3 hr. PR: Mkt. 111. Corporate procurement problems facing modern purchasing executives.
- 215. *Marketing Research*. I, II. 3 hr. PR: Mkt. 111, 112. Application of behavioral science and quantitative tools to solving marketing problems; research design, hypothesis testing, questionnaires, sampling and data analysis. Statistical inference tests, decision theory, Chi-square and regression and correlation.
- 313. *Marketing Administration*. I. 3 hr. PR: Mkt. 111. Analysis of problems met by management in distributing goods and services efficiently to consumers.
- 329. *Seminar in Marketing*. I or II. 3 hr.
- 491. *Advanced Study*. I, II. 1-6 hr.
- 496. *Graduate Seminar*. I, II. 1 hr.
- 497. *Research*. I, II. 1-15 hr.

Creative Arts Center

The Divisions of Art, Drama, and Music comprise the Creative Arts Center, which strives to provide a comprehensive education in the arts by achieving a balance between comprehensive classroom study of the history, philosophy, and theory of the arts with creative expression and performance.

The \$7 million first phase of the Creative Arts Center building was completed in 1968. The second phase, completed in 1973, accommodates the expanding academic needs of the three divisions, and increases the facilities for instructional programs. The theatres and galleries, all of modern design, provide public performances and exhibits that make a significant contribution toward fulfilling the cultural needs of West Virginia University, the state, and the local region.

Division of Music

Prospective graduate students in music are required to have completed the appropriate curriculum of undergraduate study in music at WVU, or its equivalent at another institution of recognized standing. For acceptance as a degree student the applicant must:

1. For the Master of Music degree, have an average of 2.5 on all undergraduate study; for the Ph.D. and Doctor of Musical Arts, have an average of 3.0 on the Master's degree or equivalent.

2. Submit to the Division of Music a score of at least 35 on the Miller Analogies Test.

3. Demonstrate by audition or a tape recording a level of attainment on the major instrument no more than one grade-level below the stated entrance level as indicated for the respective curriculum. Performance proficiency, based on technical ability, repertoire, and musicianship, is graded on a scale from Level 1 to Level 10. A listing of representative material by Level for each performance area is available from the Department of Applied Music of the Division of Music.

Applicants accepted for degree study must take entrance tests in theory and music history, and audition on piano. These tests and auditions will be given two days before registration. The results of these might indicate the need for remedial study. Recent graduates of the Division of Music will be admitted on their past record without these examinations or audition, unless deemed necessary by the Chairman of the Division of Music. Applicants for the areas of Theory and Composition will be tested more specifically in counterpoint (both sixteenth and eighteenth century), form, instrumentation, and orchestration. Applicants seeking acceptance as composition majors also must submit representative compositions for evaluation and approval.

Applicants who have been admitted to the Graduate School, but whose averages and test scores do not meet the qualifications outlined above, will be accepted as Special Graduates. If upon completion of at least 15 semester hours of graduate study they have maintained a B (3.0) average, and when any previous undergraduate deficiencies are removed, such Special Graduates will be accepted as degree students.

The Miller Analogies Test may be taken at any time by appointment at numerous college testing centers around the country. (The Division of Music can supply addresses upon request.) If a tape recording is submitted, it must be of a high quality, 7½ ips, and clearly marked as to name, titles of compositions, and types of tracks used (i.e., half track, quarter track mono, quarter track stereo,

etc.). The best recordings still leave much to be desired and a personal audition is encouraged if at all feasible. The auditions are administered on Saturdays on announced dates throughout the school year and summer. These dates are available upon request. For each semester or the summer session the last date is approximately six weeks before registration.

Master of Music

Candidates must establish an overall grade-point average of 3.0 within a maximum of 36 hours. Applicants will be admitted to candidacy upon the completion of 12 semester hours of graduate study. No student will be admitted to candidacy until the student has removed all undergraduate deficiencies and maintained a 3.0 average in all graduate work completed.

Candidates for the Master of Music degree may major in one of five fields: Music Education, Applied Music, Theory, Composition, and History of Music.

Graduate students majoring in Music Education will be allowed one of four options, to be determined in consultation with their adviser: (1) Thesis option; (2) Recital option (if the candidate demonstrates at least grade level of 8½ ability on the candidate's major instrument when entering); (3) Thirty-six hour option; and (4) Certification option (intended for persons possessing a bachelor's degree with a major in music). For the first three options there are the following requirements:

1. Thirty graduate hours for thesis and recital options, 36 graduate hours otherwise, with an average of 3.0.

2. Required courses: Music 410, 444, 446, one course each in the areas of theory and music history, and either Music 440 or 442.

3. Achievement of grade level 8 on the major instrument, or, as substitute for students with experience in the field, demonstration of skill in conducting or in performance important in elementary school teaching (recorder, guitar, piano, autoharp, etc.).

4. Passing of an oral examination in areas of music education, music history, and music theory.

5. Successful completion of a 4-hour thesis or 2-hour recital for the thesis and recital options, respectively.

For the certification option, a special selection of approximately 24 hours is made in cooperation with the Division of Education to satisfy certification requirements. The other hours, totaling 36, are electives to provide a good background for teaching. Undergraduate courses may be required to make up deficiencies in areas of performance or conducting.

Following are the five curricula:

<i>History of Music</i>	<i>Hr.</i>
(PR: 4 sem. of a foreign language; 12 undergraduate hr. in Music History; major instrument, Level 7; Piano, Level 3.)	
M. 430—Intro. to Mus. Biblio.....	2
M. 431—Intro. to Mus. Biblio.....	2
M. 432—Music in Middle Ages.....	3
M. 433—Music in Renaissance.....	3
M. 436—Music in Baroque Period.....	3
M. 437—Music in Classic and Romantic Periods.....	3
M. 467—Analytical Techniques.....	3
M. 497—Research.....	2
M. 497—Research (thesis).....	4
Electives*.....	5
	<hr/> 30

<i>Theory</i>	<i>Hr.</i>
(PR: Level 8 on the major instrument; Level 4 on Piano.)	
M. 430—Intro to Mus. Biblio.....	2
One of the following.....	3
M. 432—Music in Middle Ages—3	
M. 433—Music in Renaissance—3	
M. 436—Music in Baroque—3	
M. 437—Music in Classic and Romantic Periods—3	
M. 449—Psychology of Music.....	3
M. 467—Analytical Techniques.....	3
M. 470—Orchestration.....	2
M. 475—Pedagogy of Theory.....	3
M. 481—Nonserial Techniques of 20th Century Composition.....	2
M. 482—Serial Techniques.....	2
M. 497—Research (thesis).....	4
Electives.....	6
	<hr/> 30

<i>Music Education (with thesis)</i>	<i>Hr.</i>
(PR: Level 7 on the major instrument; Level 2 (for instrumentalists) or 3 (for vocalists) on piano.)	
M. 410—Conducting.....	3
M. 440—Choral Techniques or M. 422—Instrumental Techniques.....	2
M. 444—Music Education.....	3
M. 446—Introduction to Research in Music Education.....	3
M. 497—Research (thesis).....	4
Music Electives (at least one course each in theory and music history)*.....	15
	<hr/> 30

<i>Applied Music</i>	<i>Hr.</i>
(PR: Level 10 on the major instrument; M. 299-Senior Recital, or equiv.; Level 3 on piano (Level 5 for organists); for Voice, the same requirement covering French, German, and Italian as that for the B. Mus. degree in Voice.)	
M. 400—Applied Music (major instrument).....	8
M. 430—Intro. to Mus. Biblio.....	2
Two of the following courses.....	6
M. 432—Music in Middle Ages—3	
M. 433—Music in Renaissance—3	
M. 436—Music in Baroque—3	
M. 437—Classic and Romantic—3	
M. 332—Contemporary Music—3	
A course (or courses) from the Theory and/or Composition offerings	2
One of the following courses.....	2
M. 496—Lecture Recital—2	
M. 497—Research—2	
M. 498—Recital.....	4
Music Electives (no more than 4 hr. in the major applied music area).....	6
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*To be eligible for graduation the candidates must demonstrate completion of Level 8 on their major instrument.

<i>Composition</i>	<i>Hr.</i>		<i>Hr.</i>
(PR: Level 8 on the major instrument; Level 4 on Piano; evaluation of previous compositions at graduate major level.)		M. 460—Composition	6
One of following	3	M. 470—Orchestration.....	2
M. 432—Music in Middle Ages—3		M. 475—Pedagogy of Theory.....	3
M. 433—Music in Renaissance—3		M. 481—Nonserial Techniques	
M. 436—Music in Baroque—3		of Twentieth Century Composition	2
M. 437—Music in Classic		M. 482—Serial Techniques.....	2
and Romantic Periods—3		M. 497—Research (thesis).....	4
M. 467—Analytical Techniques	3	Electives.....	5

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A representative public recital is required of candidates majoring in Applied Music. Composition majors must submit as a thesis a composition in a large form.

All candidates for the Master of Music degree are required to participate at least two clock hours per week for two semesters (or summer terms) in a performing group selected with the adviser's approval.

A general comprehensive oral examination must be passed by all candidates for the Master of Music degree. Candidates may repeat this examination after a three-month period. The results of the second oral examination will normally be considered final. The examining committee will decide immediately after an unsuccessful second attempt whether a petition for a third attempt will be granted.

Doctor of Philosophy

Admission. Acceptance to the doctoral programs is competitive, and will be decided on each year in the spring, for entrance the following fall. Applicants to the program leading to the degree of Doctor of Philosophy must present necessary credentials for evaluation of previous training and experience to the graduate department of the Division of Music. This includes a score on the Miller Analogies Test, a transcript of all grades submitted through the WVU Office of Admissions and Records, and must show proof that the applicant has had a minimum of 28 semester-hours in liberal arts studies. Before admission to the program the department may, at its discretion, require the applicant to take entrance tests in various fields of music, or it may require the applicant to be present for a personal interview. Under normal circumstances the applicant must have attained an average grade of B in courses taken for the Master's degree. However, if sufficient professional experience should warrant, the department may waive the requirement of a B average or may grant an applicant conditional admittance subject to the satisfactory completion of certain specified courses or the attainment of a specified grade-point average within a semester's work.

Fields of Specialization. Applicants shall select a program within one of the following fields of specialization: (1) Theory; (2) Music Education; (3) Musicology. In addition, a minor field consisting of a minimum of 12 credit hours in another field of music or a cognate field will be required and will be chosen with the adviser's approval. If the applicant's specialization is in Musicology, the minor will ordinarily be chosen from an appropriate area of humanities.

Curriculum. The exact amount and nature of coursework to be undertaken will be determined by the adviser with the approval of the doctoral committee in the light of the applicant's previous preparation and the field of specialization. The applicant is expected to take Music 494 — Doctoral Seminar — three times. Whatever preparatory courses are needed must necessarily be taken early in the course of study (e.g., languages, statistics, bibliography, etc.).

Candidacy. Students meeting the requirements of the Division of Music and the general requirements of the Graduate School will be recommended to the Dean of the Graduate School for admission to candidacy for the degree. These requirements are (in order of occurrence):

1. Demonstrate the ability to read German and French (only one of the two for applicants in Music Education). (Upon recommendation of the adviser and with the approval of the Dean of the Graduate School, Romance language may be substituted for French.)

2. Pass written examinations satisfactorily to show:

- a. Broad knowledge in "Theory" and "Music History and Literature."

- b. Where appropriate, detailed knowledge in the minor field.

- c. Knowledge in depth in the field of specialization.

3. Pass satisfactorily a comprehensive oral examination.

4. Present and have accepted an outline and prospectus of the dissertation.

The requirement for doctoral seminars must be completed before the presentation of the prospectus.

Graduate students who have met these requirements and who have maintained an average of B in courses completed shall be admitted to candidacy. The qualifying examinations, following after satisfaction of the language requirement, shall be considered as one integral (composite) examination consisting of the written and oral parts. The applicant's doctoral committee will assess the written and oral parts within the composite whole. If an applicant does not pass the examination the applicant will be allowed to attempt the entire examination a second time. The second attempt will be considered final. However, the applicant's committee may elect to discourage a second attempt if the first does not indicate probable success upon repetition.

Residence. In general, the requirements for the degree of Doctor of Philosophy contemplate at least three years of full-time graduate work. A minimum of two semesters is required in residence in full-time graduate study at WVU beyond the master's degree or its equivalent.

Dissertation. The candidate must submit a dissertation produced at WVU under the direction of a major professor which demonstrates a high order of independent scholarship, originality, competence in research, and an original contribution to the field of specialization.

Final Examination. If the candidate's dissertation is approved and the candidate has fulfilled all other requirements, the candidate will be admitted to the final oral examination before the doctoral committee. However, a final examination will not be given in the same semester as the qualifying examination. At the option of his committee, a written examination may also be required. The final examination(s) shall be concerned with the dissertation, its contribution to knowledge, its relation to other fields, and the candidate's grasp of the field of specialization.

Time Limitation. Requirements for the degree of Doctor of Philosophy must be completed within seven years.

Doctor of Musical Arts in: Performance and Literature; Composition

Admission. Acceptance to the doctoral programs is competitive, and will be decided on each year in the spring for entrance the following fall. Applicants to the program leading to the degree of Doctor of Musical Arts must present necessary credentials for evaluation of previous training and experience. This includes a transcript of all previous grades (submitted through the WVU Office of Admissions and Records) which must show proof that the applicant has had a minimum of 28 semester hours in liberal arts studies. A score on the Miller Analogies Test must be submitted to the graduate department of the Division of Music. To be admitted to the program the applicant must have attained an average grade of B in courses taken for the applicant's Master's degree.

For performance, copies of programs of recent major recitals must be submitted. The applicant must be approved for the program by an Audition Committee, by giving evidence of superior performance, artistic maturity, and extensive repertoire as specified under Graduate Applied Music Requirements. The Audition Committee includes the Chairman of the Division of Music, the Chairman of the Applied Music Department, and the major professors involved with the degree.

For composition, the applicant must be approved for the program by an Evaluation Committee on the basis of scores presented of the applicant's works, accompanied by recordings if possible, which will show a successful handling of various forms and media and indicate the capacity to attain professional standing in the applicant's field.

Fields of Specialization. The degree of Doctor of Musical Arts is offered in the area of Performance and Literature in the fields of specialization of: (1) Piano, (2) Voice, and (3) Organ, and in Composition.

Curriculum. The exact amount and nature of coursework to be undertaken by an applicant will be determined by the adviser with the approval of the Doctoral Committee in the light of the applicant's previous preparation and field of specialization.

Candidacy. Graduate students meeting the requirements of the Division of Music and general requirements of the Graduate School will be recommended to the Dean of the Graduate School for admission to candidacy for the degree. These requirements are (in order of occurrence):

1. Demonstrate minimal acquaintance with German and French by the completion of German 2 and French 2 (or their equivalents) with a grade of C or better. (Students may petition to substitute Italian or Spanish for French.)
2. Pass written examinations satisfactorily to show:
 - a. Broad knowledge in Theory and Music History and Literature.
 - b. Knowledge in depth: (1) in the literature of the field of specialization, or (2) composition.
3. Pass satisfactorily a comprehensive oral examination.
4. Present a public recital (performance only).

Graduate students who have met these requirements and who have maintained an average of B in courses completed shall be admitted to candidacy. These qualifying examinations, after fulfilling the language requirement, are considered as one integral (composite) examination consisting of the written and oral parts. The applicant's doctoral committee will assess the written and oral parts within the composite whole. If an applicant does not pass the examination the applicant will be allowed to attempt the entire examination a second

time. The second attempt will be considered final. However, the committee may elect to discourage a second attempt if the first does not indicate probable success upon repetition.

Residence. In general, the requirements for the degree of Doctor of Musical Arts contemplate at least three years of full-time graduate work. A minimum of two semesters is required in residence in full-time graduate study at WVU beyond the master's degree or its equivalent.

Recitals, Performance, and Research (performance only). Recital, performance, and research requirements should be the equivalent to approximately 20 credit hours. A prospectus indicating the various performances and/or projects to be presented for the satisfaction of these requirements will be drawn up by the candidate with the help of the candidate's major professor, and submitted to the candidate's doctoral committee for approval. (Approximate credit-hour equivalents to be established by the candidate's committee are: solo recital, 3-5; written research project, 3-5; major opera role, 2-4; lecture recital, 2-4; chamber music program, 2-4; program accompaniment, 1-2; concerto, major oratorio role, 2.) This prospectus should display a variety of kinds of music and types of presentations appropriate for the preparation of an artist-teacher, and may include solo recitals, lecture recitals, chamber music programs, concerto performances, major roles in opera or oratorio, major accompaniments, or written research projects. It would include at least two solo recitals and normally will include either a research project or a lecture recital. Approximately one-half of the 20-credit bloc must be earned after admission to candidacy.

Compositions and Research (composition only). Composition and research requirements should be the equivalent to approximately 20 credit hours. "Equivalent credit" will be assigned by the student's doctoral committee on the basis of four to seven credits for a major work (symphony, opera, etc.) and fewer credits for lesser works. Credits may be assigned both on a qualitative and a quantitative basis. Proposed works will be approved by the committee to insure that sufficient variety and breadth of compositional experience is included. Normally, at least one major work and one written paper will be required. The latter will be a research paper, generally an analysis of some aspect of twentieth-century composition, and would be assessed at 2-4 credit hours.

Final Examination (performance only). The final examination will consist of a *major* solo recital (which will be regarded as the equivalent of the Ph.D. dissertation defense). Immediately following the public performance the candidate's committee will meet to evaluate the performance as evidence of mature musicianship and finished technique. Such a final examination recital will not be given in the same semester as the qualifying examination.

Final Examination (composition only). If the candidate's compositions and project are approved and the candidate has fulfilled all other requirements, the candidate will be admitted to the final oral examination before the candidate's Doctoral Committee. At the option of the candidate's committee, a written examination also may be required. The final examination(s) shall be concerned with the compositions, the project (if any), and the candidate's grasp of the field of specialization and its relation to other fields. The final examination will not be given in the same semester as the qualifying examination.

Time Limitation. Requirements for the degree of Doctor of Musical Arts must be completed within seven years.

Doctor of Education

The degree of Doctor of Education is offered in cooperation with the College of Human Resources and Education. The sequence of prerequisites to admission, prerequisites to candidacy, and requirements for the degree are set forth in the College of Human Resources and Education section of this *Catalog*. The requirements for the degree of Doctor of Education for students in Music are identical with those for students in Education.

Music

Applied Music

- 218. *Repertoire*. I. 0-2 hr.
- 219. *Repertoire*. II. 0-2 hr.
- 400. *Applied Music*. I, II. 1-4 hr. (Open to qualified students in any field in Applied Music. May be repeated as many times as necessary or desirable.) A student must demonstrate ability of grade-level 4 on an instrument to receive credit in Music 400 on that instrument. Students other than music majors may take a maximum of one 30-minute lesson per week. If such students demonstrate ability of grade-level 7, this may be at 2 credits; otherwise, the maximum for such students is 1 credit.
- 409. *Master Class in Applied Repertoire*. I, II. 2 hr. PR: Consent. Designed to give coverage through performance of the literature of a specific D.M.A. Applied Music field. (Course may be repeated for credit.)

Conducting

- 410. *Conducting*. I. 3 hr. PR: Music 52 or equiv. Instrumental and choral conducting. Major works are prepared and conducted through the use of recordings and the large WVU music organizations.

Literature

- 230. *Music of Africa*. I. 3 hr. Traditional music of selected areas of Africa south of the Sahara with particular reference to East Africa. The diverse musical cultures with emphasis on historical background, instruments, ensembles, forms, and styles, and music in its social context.
- 231. *History of Music*. I. 3 hr. Survey of music history from the pre-Christian era to the baroque.
- 232. *History of Music*. II. 3 hr. Survey of music history from the baroque to the contemporary period.
- 330. *Survey of Vocal Music*. I. 3 hr. PR: Music 33-34 or equiv. and consent. Survey of masses, oratorios, cantatas, and operas from the Renaissance to the twentieth century. Solo repertoire will not be included.
- 331. *Survey of Instrumental Music*. II. 3 hr. PR: Music 33-34 or equiv. and consent. Survey of instrumental ensemble music, chamber music, concertos, symphonies, and other orchestral music from late Renaissance to the twentieth century. Solo repertoire will not be included.
- 332. *Studies in Contemporary Music*. I. 3 hr. PR: Music 33-34.
- 334. *Collegium Musicum*. I, II. 1-2 hr. Performance of outstanding musical works not in the standard repertory. Although open as a performance group to upperclassmen, graduate students will select appropriate vocal and instrumental music, investigate modes of performance, prepare any necessary editions, and direct rehearsals under supervision. (May be repeated for credit.)

423. *Keyboard Literature*. S. 3 hr. PR: Music 218, 219. Intensive study of the literature for keyboard instruments and the history of the literature.
424. *Song Literature*. S. 3 hr. PR: Music 218, 219. Intensive study of the Art Song and the Lied and the history of their development.
430. *Introduction to Musical Bibliography*. I. 2 hr. PR: Music 33, 34 or equiv. Survey of musical bibliography with appropriate research assignments.
431. *Introduction to Musical Bibliography*. II. 2 hr. PR: Music 430. Continuation of Music 430 with emphasis on the individual student's field of specialization and more detailed research problems.
432. *Music in the Middle Ages*. II. 3 hr. PR: Music 33, 34 or equiv. and consent. Detailed study of the music and musical practice from the beginning of the Christian era to 1400.
433. *Music in the Renaissance*. II. 3 hr. PR: Music 33, 34 or equiv. and consent. Continuation of Music 432 through the sixteenth century.
436. *Music in the Baroque Period*. I. 3 hr. PR: Music 33, 34 or equiv. and consent. Detailed study of the music and musical practice of the period from 1600 to 1750.
437. *Music in the Classic and Romantic Periods*. I. 3 hr. PR: Music 33, 34 or equiv. and consent. Continuation of Music 436 covering the period from 1750 to 1900.
438. *History of Notation*. S. 3 hr. PR: Music 33, 34 or equiv. Detailed study in transcribing the musical manuscripts of the Middle Ages.
439. *History of Notation*. S. 3 hr. PR: Music 33, 43 or equiv. Continuation of Music 438 covering the Renaissance period.

Church Music

429. *Survey of Sacred Music*. 4 hr. PR: Music 33, 34 or equiv. Study of music suitable to the liturgical year, including the historical background of the Jewish, Catholic and Protestant liturgies.

Music Education

240. *Clinic Chorus, Band, and Orchestra*. I, II. 1 hr. Experience in selection, preparation, and class performance of music appropriate for high school choral and instrumental groups. Students who have completed four semesters of Music 51 will prepare, teach, and conduct class performances.
245. *Marching Band Techniques*. I. 2 hr. PR: One semester college marching band experience or consent. Study and practical application of techniques of planning and preparation of school marching band performances.
248. *Music Arranging for Public School Groups*. I, II. 2 hr. PR: Music 66. Practical experience in techniques of making simple, workable arrangements of music for public school choral and instrumental performance groups.
340. *Band, Orchestra, Choral, Opera Theatre, and Music Education Clinics*. 1-2 hr. Special problems of organization and development of various performing organizations. Lecture, laboratory, and discussion groups.
341. *Music in the Elementary School*. I. 3 hr. PR: Music 30, 41, 42, or consent. Development of skills, procedures, techniques, and materials used by general classroom teacher of music in grades K-8. (Not open to music majors.)
342. *Teaching of Music Appreciation*. 3 hr. PR: Music 30, 41, 42, or equiv. Review of information, materials, sources, and techniques involved in teaching appreciation of music in public schools. (Not open to music majors.)

343. *Contemporary Techniques in Classroom Music*. I. 3 hr. PR: Music 152 or consent. Principles and practice of contemporary techniques in elementary and junior high school classroom music, including those of Orff and Kodaly.
344. *Appalachian Music for the Classroom*. II. 3 hr. Lecture, demonstration, and practical experience in performance of Appalachian vocal and instrumental music and in use of this music in public school classrooms. May involve field trips and construction of inexpensive instruments.
346. *Music in the Junior High School*. S. 2 hr. PR: Music 151, 152 or equiv. Consideration of the potentialities and special needs of the junior high school in music education; programs, procedures, and materials.
440. *Choral Techniques*. II. 2 hr. PR: Music 151, 152 or equiv. Advanced techniques and procedures involved in development of ensembles.
442. *Instrumental Techniques*. I. 2 hr. PR: Music 151, 152 or equiv. Advanced techniques and procedures involved in individual performance and instruction through lecture-demonstrations by applied music faculty.
444. *Music Education*. II. 3 hr. PR: Music 151, 152, or equiv. Survey and critical study of the total music education program.
445. *Supervision of Music*. S. 2 hr. PR: Music 151 or 152 or equiv. Concepts, responsibilities, duties and techniques that supervisor needs to effectively exercise leadership in developing, coordinating, and refining the complete Music Education program in public schools from kindergarten through 12th grade.
446. *Introduction to Research in Music Education*. I. 3 hr. PR: Music 151, 152 or equiv. Methods and measures necessary for conduct and understanding of research in music education.
448. *Psychology of Music Learning*. II. 3 hr. Application of learning theory to music learning; nature of musical talent; music talent testing.
449. *Psychology of Music*. I. 3 hr. Introductory study of musical acoustics and psychology of perception of music.
452. *Aesthetics of Music*. II. 2 hr. PR: Music 33, 34 or consent. Examination of the main classical and contemporary aesthetic theories and their applications to music.

Opera

419. *Opera Theatre*. I, II. 0-4 hr. PR: Music 19 or consent. Continuation of Music 19. Performance of major roles and advanced production techniques. Qualified students will undertake production-direction projects under supervision.

Theory and Composition

260. *Upper-Division Composition*. I, II. 2 hr. PR: Four semesters Music 160, or consent based on scores submitted. Creative writing with emphasis on practical composition for performance. (May be repeated for credit.)
263. *Counterpoint*. I. 2 hr. PR: Music 68 or consent. Sixteenth century counterpoint.
264. *Counterpoint*. II. 2 hr. PR: Music 68 or consent. Eighteenth century counterpoint.
265. *Analysis of Musical Form*. I. 3 hr. PR: Music 68 or consent. Detailed study of the structure of music.
266. *Major Project in Theory, Composition, or Music History*. I, II. 2 hr. PR: Music 68.
267. *Electronic Music*. I. 2 hr. PR: Music 68 and consent. Technology of producing electronic music. Methods of producing electronic compositions, relationship between sound signal and sound perceived, ear training, analysis of examples from electronic music literature, and composition of electronic music.
268. *Electronic Music*. II. 2 hr. PR: Music 267. Continuation of Music 267.

460. *Composition*. I, II. 3 hr. PR: Consent. Primarily for candidates for the graduate degrees in Theory or Composition. (May be repeated for credit.)
467. *Analytical Techniques*. I. 3 hr. Study of various theories of musical analysis and their application.
470. *Orchestration*. I, II. 2 hr. PR: Music 172 or equiv. Major projects of orchestration. (May be repeated for credit; max. credit, 6 hr.)
472. *Band Arranging*. II. 2 hr. PR: Music 172 or equiv. Major projects in arranging for the concert band.
475. *Pedagogy of Theory*. II. 3 hr. PR: Music 68 and consent. Consideration of various approaches to the teaching of theory.
481. *Nonserial Techniques of Twentieth Century Composition*. I. 2 hr. Theoretical and analytical course including application of various techniques in student compositions.
482. *Serial Techniques*. II. 2 hr. Theoretical and analytical course including the application of serial techniques in student compositions.

Research or Recital

492. *Advanced Studies in Music*. I, II. 2-8 hr. PR: Consent, which in some cases may be contingent upon doctoral foreign language examination or a course in statistics. Primarily for Ph.D. candidates. Intensive individualized reading reported in group discussions. Course may be repeated as many times as necessary, in as many areas as needed, and several different sections (i.e. areas) may be pursued simultaneously.
493. *Recital*. I, II. 2 hr. For Music Education majors only.
494. *Doctoral Seminar*. I, II. 2 hr. PR: Consent. Intensive individual investigation and preparation of research papers. (Course may be repeated for credit; max. credit, 8 hr.) Presented by the combined doctoral staff in music.
495. *Dissertational Guidance*. I, II. 1-8 hr.
496. *Lecture Recital*. I, II. 2 hr. PR: Music 430.
497. *Research*. I, II. 1-15 hr. PR: Music 430 or consent.
498. *Recital*. I, II. 1-4 hr. PR: Music 299 (Senior Recital) or equiv. Masters Applied students shall be permitted to give a recital only after they pass a qualifying audition before a committee of at least three specialists in the area, in a semester previous to that in which the recital is to be given.

Division of Art

Candidates for the Master of Fine Arts in Art, Master of Arts in Art, and Master of Arts in Art Education must have an undergraduate degree in art, art education, or the equivalent. Before being admitted to a degree program, the student must demonstrate ability through the presentation of a portfolio. The portfolio will consist of a minimum of twenty slides and/or photographs representing at least ten pieces of work. Slides or photographs must be numbered to correspond to their description. The description should indicate the size and media of work and briefly explain the problem undertaken. The portfolio, slides, and photographs should clearly indicate the name and address of the applicant. The University is not responsible for loss or damage to portfolios. The candidate assumes all mailing and insurance costs relating to the portfolio requirements.

Any deficiencies in the undergraduate preparation must be completed, without credit, before the applicant is admitted as a regular student in the

program requested. Final acceptance in any of the graduate Art programs will depend upon the recommendation of the Graduate Art Faculty Review Committee and the available facilities. Depending upon the interest and ability of the students, the graduate art curriculum offers flexibility in subject options and concentrated studio work.

Applicants mailing portfolios or desiring additional information can contact the Graduate Art Adviser, Division of Art, Room 419A, Creative Arts Center, West Virginia University, Morgantown, WV 26506.

Master of Fine Arts in Art

The requirements for the degree are as follows: Completion of a minimum of 60 hours of graduate work to include 36 hours in a single field of art, 12 hours of electives within the Division of Art, 6 hours of electives outside the division, and 6 hours for a graduate exhibition and thesis statement.

Master of Arts in Art

The requirements for the degree are as follows: Completion of a minimum of 30 hours of graduate work in art, including not more than 6 hours of thesis or 3 hours for graduate exhibition and thesis statement.

Master of Arts in Art Education

The degree of Master of Arts in Art Education is offered in cooperation with the College of Human Resources and Education. Two options for the degree are available. The requirements for each option are: 1. The completion of 12 required hours in graduate Education and 18 hours in the Division of Art; 2. The completion of 6 required hours in graduate Education, 6 hours of electives in graduate Education and 23 hours in the Division of Art.

Art

- 200. *Directed Art Studies*. I, II, S. 1-15 hr. PR: Consent. Studies in painting, sculpture, printmaking, graphic design, drawing, ceramics; includes directed or independent study in special art topics. (May be repeated for credit.)
- 211. *Figure Drawing*. I, II. 3 hr. PR: Art 12, 121, or equiv. Drawing course in compositional structure from the figure.
- 212. *Advanced Drawing*. I, II. 3 hr. PR: Art 211 or equiv. Advanced tutorial drawing course. (May be repeated for credit.)
- 250. *Art History Before 1900*. I. 3 hr. PR: Art 106, or equiv. Significant developments in art up to 1900.
- 260. *Art History After 1900*. II. 3 hr. PR: Art 106, or equiv. Significant developments in art from 1900 to present.
- 300. *Graduate Art Studies*. I, II, S. 1-15 hr. PR: Consent. Directed or independent study in painting, sculpture, ceramics, printmaking, graphic design, drawing. (May be repeated for credit.)
- 400. *Graduate Exhibition, Thesis Statement*. I, II, S. 3-6 hr. PR: Consent.
- 490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Supervised practices in college teaching of art.

491. *Advanced Study*. I, II, S. 3-9 hr. PR: Consent. Investigation in advanced subjects not covered in regularly scheduled courses. Study may be independent or through specially scheduled requirements.
497. *Research*. I, II, S. 1-15 hr.
499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking coursework credit but who wish to meet residence requirements, use University facilities, and participate in its academic and cultural program.

Division of Drama

Master of Arts

Prospective applicants who possess a bachelor's degree from an accredited college or university may be admitted to the program. Any deficiencies in undergraduate preparation in upper-division courses in drama appropriate to the anticipated area of specialization will be made up either without credit or (in instances of 200 or above numbered courses) added to the credit required for the degree.

1. Successful completion of the minimum number of required graduate hours as set forth in Program A or Program B below.

2. Completion of, within the framework of the Graduate School and Division of Drama standards, one of the two following programs of study:

A. Concentration program which meets the following requirements:

- (1) Successful completion of at least a minimum of 30 semester hours of graduate credit. No more than 9 of the 30 credit hours will be in research and thesis.
- (2) Successful passage of comprehensive examinations in all areas of drama. Such examinations are administered toward the end of the student's coursework and then only if and when the student has a 3.0 grade-point average or 75 per cent of the student's credit hours are of B grade or higher.
- (3) Submission for approval by the student's graduate committee of a thesis demonstrating original research and scholarly reporting.
- (4) Successful completion of an oral examination on the thesis.

B. General program which meets the following requirements:

- (1) Similar to above program (A) with a total of 36 hours required. The 6 additional hours are to be substituted for the thesis requirement and to be taken in drama or cognate fields upon the approval of the faculty adviser.
- (2) Successful passage of comprehensive examinations in all areas of Drama. Either a 3.0 grade-point average or 75 per cent of B grades for the hours carried is prerequisite to taking comprehensive examinations.
- (3) The student pursuing Program A or Program B will emphasize either a directing or a design specialty, oriented toward a professional or teaching career in drama. At this same time the degree is designed as a broadly based, well rounded program coupling breadth of subject matter with depth in the area of specialization.

Thesis Program

<i>First Sem.</i>	<i>Hr.</i>	<i>Second Sem.</i>	<i>Hr.</i>
Drama 431	3	Drama 400	3
Drama 460	3	Drama 460	3
Drama 200-level courses.....	6	Drama 497	3
	—	Drama 286	3
	12		12
<i>Summer Session or Regular Term</i>			
Drama 460	3		
Drama 497	3		
	6		

Non-Thesis Program

<i>First Sem.</i>	<i>Hr.</i>	<i>Second Sem.</i>	<i>Hr.</i>
Drama 431	3	Drama 400	3
Drama 460	3	Drama 460	3
Drama 200-level courses.....	9	Drama 497	3
	—	Drama 286	3
	15	Drama 200-level course.....	3
			15
<i>Summer Session or Regular Term</i>			
Drama 497	3		
Drama 460	3		
	6		

Doctor of Education

The degree of Doctor of Education is offered to a limited number of students in cooperation with the College of Human Resources and Education. Information regarding prerequisites to candidacy and requirements for the degree may be obtained from the Chairman or the Coordinator of Graduate Programs in the Division of Drama.

Drama

202. *Advanced Scene Design.* II. 3 hr. PR: Drama 100, 102, or consent. Lecture and laboratory in theories of scene design for stage and television, including actual construction of designs. (Open to juniors, seniors, and graduate students.)
203. *Advanced Theatre Lighting Design.* I. 3 hr. PR: Drama 103 or consent. Advanced theories of lighting and design for the stage. Practical experience with advanced lighting equipment.
204. *Advanced Costume Design.* II. 3 hr. PR: Drama 104 or consent. Individual study in design styles and techniques. Survey of costume design in theatre today.
250. *Advanced Problems in Interpretation.* I. 3 hr. PR: Drama 50 and consent. Deals with individual problems of advanced students in interpretation.
251. *Professional Reading.* II. 3 hr. PR: Consent. Intensive training in interpretation. Designed to meet needs of the individual. Full length public recital prepared and presented. (Limited enrollment.)

252. *Art of Storytelling*. S. 3 hr. PR: Consent. Principles involved in effective presentation of stories, with practical experience in classroom and before audiences. Stories of all types for adults and children studied.
260. *Theatre Performance and Rehearsal Laboratory*. I, II. 3 hr. PR: Drama 161 or consent. Participation in assigned theatre projects. Appreciation of creativity and performance techniques in the theatre. (Majors only. Max. credit, 6 hr.)
275. *Advanced Acting*. I. 3 hr. PR: Drama 75 and consent. Advanced theories in acting to include script and style analysis — modern and historical.
276. *Actors Studio*. II. 1 hr. PR: Drama 76, 176, 275, or consent. Advanced laboratory experience in acting and production styles of historical and modern theatre through the use of staged scenes.
280. *Advanced Play Directing*. II. 3 hr. PR: Drama 180, or consent. Emphasis on work of director as an integrating artist. High level of proficiency in direction of a one-act play required of all students enrolled.
281. *Theatrical Dialects*. I, II. 3 hr. PR: Consent. Study and mastery of fifteen common dialects used in theatre, motion pictures, and television.
282. *Creative Dramatics*. I, II, S. 3 hr. PR: Drama 75 or consent. Study and practice of creative dramatic activity as a method of learning and self development for children.
284. *Puppetry*. I. 3 hr. PR: Drama 75 or consent. Comprehensive survey of construction and manipulation techniques of puppets. Evaluation of role of puppetry in child behavior and therapy techniques.
285. *Advanced History of Theater*. I. 3 hr. Historical survey of theater from primitive times to present. Includes both oriental and occidental theaters.
286. *Drama Criticism and Aesthetics*. II. 3 hr. Survey of chief critical and aesthetic theories of drama — ancient, modern, and contemporary.
290. *Playwriting*. II. 3 hr. PR: Consent. Development of creative ability in dramatic composition. Techniques and problems of playwriting. Of cultural value, but primarily a writing course.
375. *Styles of Acting and Directing*. II. 3 hr. PR: Drama 180 and 280, or consent. Extensive and intensive study of acting and directing styles.
400. *Applied Creative Performance*. 3 hr. Creative projects and/or performance. Must have faculty approval as part of student's graduate program.
431. *Research Methods and Survey*. 3 hr. PR: Consent. Research methods and techniques and general survey of the field of drama.
444. *Survey of Educational Methods and Practices*. 3 hr. Survey and critical study of the total drama education program.
460. *Specialized Seminars*. 3-9 hr. PR: Consent. Selected fields of study in drama. (May be repeated for a max. of 9 credit hours.)
491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
497. *Research*. I, II. 1-15 hr.
499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use University facilities, and participate in its academic and cultural programs.



Engineering students learn surveying on the Evansdale Campus. (Engineering Sciences Building in background.)

College of Engineering

A student desiring to take courses for graduate credit in the College of Engineering must first comply with the appropriate regulations of the Graduate School.

To become a candidate for a degree a student must apply for admission through the Office of Admissions and Records to the major department of the student's choice. Acceptance by the major department will depend upon review of the student's academic background and available facilities in the department.

An applicant with a baccalaureate degree, or its equivalent, from a department accredited by the Engineers' Council for Professional Development (ECPD) will be admitted on the same basis as engineering graduates of West Virginia University. Lacking these qualifications, an applicant must first fulfill the requirements of the department in which the student is seeking an advanced degree.

No credits which are reported with a grade lower than C are acceptable toward an advanced degree.

To qualify for an advanced degree, the graduate student must have a grade-point average of at least 3.0 based on all courses acceptable for graduate credit for which the student has received a grade from the University.

A graduate student in the College of Engineering must comply with the regulations of the major department and with the requirements as stated in the "Guide to the Graduate Program in Engineering."

Master of Science

Each department in the College of Engineering has a designated M.S. degree and the College has an undesignated degree, Master of Science in Engineering. For all M.S. degrees each candidate will, with the approval of the graduate committee, follow a planned program which must contain a minimum of 30 semester credit hours no more than 12 of which can be at the 200 level. If a thesis or a problem report is part of the candidate's program, not more than 6 semester credit hours of research leading to an acceptable thesis nor more than 3 semester credit hours of work for an acceptable problem report may be applied toward the semester credit hour requirement.

Individual departments may establish minimum requirements greater than those adopted for the College as a whole; these departmental requirements are contained in this *Catalog*.

The Master of Science in Engineering program is designed for students who desire to pursue work in areas other than that of their baccalaureate degree in engineering or science. Graduate students who wish to become candidates for the degree should register with the department in which the major portion of the work is to be done.

Admission to candidacy for an M.S. degree is required before obtaining that degree. A graduate student may apply for admission to candidacy by formal application after completing a minimum of 12 semester hours of graduate courses with a grade-point average of at least 3.0, based on all graduate courses, taken in residence, for which the student has received a grade at the time of application.

Doctor of Philosophy

The College of Engineering has an interdisciplinary program leading to the degree of Doctor of Philosophy. The departments approved for participation in this program are: Aerospace Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering and Mechanics.

Admission. Admission to the Graduate School is required of all applicants for admission to a program of study and research leading to the Ph.D. Applicants for admission are expected to have successfully completed a Bachelor of Science or Master of Science degree program in some phase of engineering equivalent to the program leading to this degree in effect at WVU. Admission to the Graduate School does not necessarily assure entrance into the College of Engineering Ph.D. program.

After the student has earned 24 to 36 graduate credit hours (or completed Master's degree requirements), the student and the academic adviser will submit a plan of study to the College's Engineering Graduate Programs Committee. A student becomes admitted to the College's interdisciplinary program upon formal approval of the plan of study.

Candidacy. After admission to the program and after a period of residence, the applicant will be admitted to a comprehensive preliminary or qualifying examination (written and oral) in which the student must demonstrate: (a) a grasp of the important phases and problems of the field of study and an appreciation of their relation to other fields of human knowledge and accomplishments; and (b) the ability to employ rationally the instruments of research developed in the major field.

When an applicant has successfully passed the comprehensive examination the student will be formally admitted to candidacy for the doctor's degree.

Curriculum. The Doctor of Philosophy degree is not awarded for the mere accumulation of course credits nor for the completion of a definite residence requirement. The amount and nature of the course work undertaken by the candidate will be established for each individual candidate with the object of insuring a rational and coherent progression of academic development beyond the Bachelor of Science degree. However, to attain the educational objectives of the College's interdisciplinary program, each program of study must contain at least one of the following:

- a. One 12-hour minor in a department of engineering other than that of the candidate's major, or
- b. two 6-hour minors in departments of engineering other than that of the candidate's major, or
- c. one 6-hour minor in a department of engineering other than that of the candidate's major and one 6-hour minor in the natural or physical sciences.

In addition, minors in areas other than engineering are encouraged to broaden the candidate's knowledge and the appreciation of human accomplishments.

Residence. The requirements for the degree of Doctor of Philosophy contemplate at least three years of full-time graduate work beyond the bachelor's degree. This must include a minimum of two semesters of residence in full-time graduate study at WVU.

Dissertation. The candidate must submit a dissertation on a topic within the area of the student's major interest. The dissertation must represent the results

of independent research and must constitute a definite contribution to knowledge. It is anticipated that the work leading to the completion of the dissertation would require 24 hours in research and/or dissertation credits or satisfactory evidence of equivalent time devoted to research and preparation of the dissertation.

Final Examination. Upon completion and approval of the dissertation and fulfillment of all other requirements, the candidate shall pass a final examination conducted by a committee of at least five members recommended by the major department and appointed by the Dean of the Graduate School. The examination shall be primarily a defense of the dissertation although other questions necessary to establish the qualifications of the candidate for the degree may be in order.

Doctor of Education

The degree of Doctor of Education is offered in cooperation with the College of Human Resources and Education. The sequence of prerequisites to admission, prerequisites to candidacy, and requirements for the degree are set forth in the Education section of this *Catalog*. The requirements for the degree of Doctor of Education for students in Engineering are identical with those for students in Education.

AEROSPACE ENGINEERING

Master of Science in Aerospace Engineering

Students must comply with rules and regulations as outlined in general requirements for graduate work in the College of Engineering.

Thesis. Normally a thesis is required of all candidates for the degree of Master of Science in Aerospace Engineering. Approval by the Advisory and Examining Committee is necessary before the thesis will be accepted. The thesis must be presented in a form that conforms to general requirements of the Graduate School, and in addition should conform to additional thesis requirements of the Department of Aerospace Engineering.

Whether or not a thesis is required shall be determined by the department and shall be recorded in the student's file as a part of a planned program.

Final Examination. Each candidate for the master's degree shall pass a final examination administered by the student's Advisory and Examining Committee.

Courses. The following grouping of courses is given as a guide for selecting a graduate program leading to the degree of Master of Science in Aerospace Engineering:

Group I. Required of all candidates. Six semester credit hours of advanced mathematics beyond a first course in differential equations.

Group II. Major. Minimum of 9 semester hours of aerospace engineering courses, other than A.E. 497, in the 200, 300, and 400 series.

In order to meet the minimum requirements for the degree of Master of Science in Aerospace Engineering, additional courses may be taken from the following, subject to the approval of the student's Advisory and Examining Committee:

1. Courses from Groups I and II.
2. Aerospace engineering courses in the 200 series which are not re-

quired for the degree of Bachelor of Science in Aerospace Engineering.

3. Physics and chemistry courses in the 200 to 400 series.
4. Courses in other departments of the College of Engineering in the 200 to 400 series.

Doctor of Philosophy

A candidate for the degree of Doctor of Philosophy must comply with the rules and regulations as outlined in general requirements for graduate work in the College of Engineering.

Candidates for the Doctor of Philosophy degree, regardless of their specific major, may be required to attain a proficiency in each of the following areas: (1) fluid mechanics, (2) thermodynamics, and (3) applied mathematics.

Research work for the doctoral dissertation must show a high degree of originality on the part of the student and must constitute an original contribution to the field of aerospace engineering. It must have good literary form and style, and must give a thorough survey of prior literature in the subject. The candidate is required to take a final oral examination upon completion of the dissertation in defense of the research.

Aerospace Engineering

A.E.

215. *Experimental Fluid Dynamics II*. 3 hr. PR: A.E. 115. Continuation of A.E. 115 with increased emphasis on dynamic measurements. Shock tube/tunnel and subsonic and supersonic measurements. Experiments include optical techniques, heat transfer to models, and viscous flow measurements. Error analysis of test data. 2 hr. lec., 3 hr. lab.
216. *Applied Aerodynamics*. 3 hr. PR: A.E. 140. Chordwise and spanwise airload distribution for plain wings, wings with aerodynamic and geometric twist, wings with deflected flaps, and wings with ailerons deflected. Section induced drag characteristics. 3 hr. lec.
220. *Guided Missile Systems*. 3 hr. PR: A.E. 112 and/or consent; A.E. 150. Design philosophy according to mission requirements. Preliminary configuration and design concepts. Aerodynamic effects on missiles during launch and flight. Ballistic missile trajectories. Stability determination by analog simulation. Performance determination by digital and analog simulation. Control, guidance, and propulsion systems. Operational and reliability considerations. 3 hr. lec.
232. *V/STOL Aerodynamics*. 3 hr. PR: A.E. 112. Fundamental aerodynamics of V/STOL aircraft. Topics include propeller and rotor theory, helicopter performance, jet flaps, ducted fans and propeller-wing combinations. 3 hr. lec.
234. *Fluid Dynamics III*. 3 hr. PR: A.E. 112. Fundamentals of viscous flow and the Navier-Stokes equation; incompressible laminar flow in tubes and boundary layers; transition from laminar to turbulent flow; incompressible turbulent flow in tubes and boundary layers. 3 hr. lec.
235. *Fluid Dynamics IV*. 3 hr. PR: A.E. 112. One-dimensional, non-steady gas dynamics. Shock tube theory and applications. Fundamentals of supersonic and hypersonic flow and the determination of minimum drag bodies. 3 hr. lec.

242. *Flight Testing*. 3 hr. PR: A.E. 140. Applied flight test techniques and instrumentation, calibration methods, determination of static performance characteristics, and introduction to stability and control testing based on flight test of Cessna Super Skywagon airplane. Flight test data analysis and report preparation. 1 hr. lec., 6 hr. lab.
249. *Space Mechanics*. 3 hr. PR: Math. 18, M.E.M. 51. Flight in and beyond the earth's atmosphere by space vehicles. Laws of Kepler and Orbital theory. Energy requirements for satellite and interplanetary travel. Exit from and entry into an atmosphere. 3 hr. lec.
250. *Advanced Topics in Propulsion*. 3 hr. PR: A.E. 150 or consent. Special problems of thermodynamics and dynamics of aircraft power plants. Chemical rocket propellants and combustion. Rocket thrust chambers and nozzle heat transfer. Nuclear rockets. Electrical rocket propulsion. 3 hr. lec.
260. *Design of Flight Structures I*. 3 hr. PR: A.E. 161. Structural design and analysis of flight vehicle members. Layout and detail design of specified components are required. 1 hr. lec., 6 hr. lab.
265. *Aeroelasticity*. 3 hr. PR: A.E. 160. Vibrating systems of single degree and multiple degrees of freedom, flutter theory and modes of vibration, torsional divergence, and control reversal. 3 hr. lec.
280. *Aerospace Problems*. 1-6 hr. Upper division and graduate.
285. *Thesis*. 2-6 hr. PR: Senior standing and consent.
291. *Introduction to Research*. 1-3 hr. PR: Senior standing and consent. Methods of organizing theoretical and experimental research. Formulation of problems, project planning, and research proposal preparation.
292. *Research Problems*. 2-6 hr. PR: A.E. 291 or consent. Performance of the research project as proposed in A.E. 291. Project results are given in written technical reports, with conclusions and recommendations.
300. *Seminar*. Credit. Attendance required of all graduate students at scheduled Aerospace Engineering seminars.
315. *Fluid Flow Measurements*. 3 hr. PR: A.E. 112 or consent. Principles and measurements of: static and dynamic pressures and temperatures, velocity and Mach number forces. Optical techniques and photography, Design of experiments. Review of selected papers from the literature. 2 hr. lec., 3 hr. lab.
380. *Special Problems*. 2-4 hr. PR: Consent of department chairperson. For graduate students in the non-research program. The student will select a specialized field and follow a course of study in that field under the supervision of a counselor.
381. *Specialized Study Program*. 1-6 hr. PR: Consent. Discussion, individual study reports in aerospace engineering.
411. *Dynamics of Viscous Fluids*. 3 hr. PR: Consent. Exact solutions of the Navier-Stokes equations. Laminar incompressible and compressible boundary layer theory, similarity solutions and integral methods. 3 hr. lec.
412. *Fundamentals of Turbulent Flow*. 3 hr. PR: A.E. 411 or consent. Basic experimental data. Application of semi-empirical theories to pipe, jet and boundary layer flow. Turbulent heat and mass transfer. Statistical theory of turbulence and recent applications. 3 hr. lec.
413. *Dynamics of Real Gases*. 3 hr. PR: A.E. 411 or consent. Fundamentals of multicomponent, chemically reacting, gas flows; thermodynamic properties of equilibrium mixtures from statistical mechanics; chemical kinetics; effects of the chemical model on high-temperature, high-speed flow properties.

425. *Perfect Fluid Theory*. 3 hr. PR: Consent. Conformal mapping including Schwarz-Christoffel and Joukowski transformations. Inviscid flows over airfoils, spheres, cones, wedges, and bodies of revolution. 3 hr. lec.
435. *Gas Dynamics I*. 3 hr. PR: A.E. 112 or consent. Nonsteady gas dynamics and shock tube theory. Shock tubes in aerospace research. Compressible flow theory in subsonic, transonic, and supersonic regimes. 3 hr. lec.
436. *Gas Dynamics II*. 3 hr. PR: A.E. 435 or consent. Transonic flow-hodograph method, the Chaplygin-Karman-Tsin approximation. Hypersonic flow-bluntbody field theory. Shock wave and viscous interaction with flow fields, blastwave theory and similar solutions. 3 hr. lec.
440. *Advanced Flight Mechanics*. 3 hr. PR: A.E. 112, 140. Dynamic stability. Obtaining flight characteristics of the vehicle from dynamic flight test techniques, such as frequency response, and transient response methods. Problems of automatic control. 3 hr. lec.
449. *Space Mechanics*. 3 hr. PR: Math. 245, A.E. 112, 150. Variational formulation of mechanics. Theory of orbits and trajectories with applications to astronomical problems. Introduction to the space environment. 3 hr. lec.
450. *Fundamentals of Combustion*. 3 hr. PR: A.E. 112 or consent. Kinetic theory, transport phenomena, chemical equilibrium and reaction kinetics. Flames, their gross properties, structure and gas dynamics. Solid and liquid propellant combustion. 3 hr. lec.
458. *Foundations of Magnetohydrodynamics I*. 3 hr. PR: Consent. Ionization in gas flows; equations of state, charge, mass, momentum, and energy conservation; effects of self-generated and external electric and magnetic fields on electrically conducting fluids and transport coefficients. 3 hr. lec.
459. *Applied Magnetohydrodynamics II*. 3 hr. PR: Consent. Incompressible and viscous MHD channel flow; plane waves in fluids, discontinuities and MHD shock waves; applications of MHD to electric power generation, etc. 3 hr. lec.
465. *Dynamics of Aerospace Structures I*. 3 hr. PR: A.E. 474 or consent. Free and forced vibrations of systems with finite and infinite degrees of freedom. Effect of rotary inertia and shear on lateral vibrations of beams. Hamilton principle and Lagrange equations in vibration problems. 3 hr. lec.
466. *Dynamics of Aerospace Structures II*. 3 hr. PR: A.E. 465. Two- and three-dimensional wing theory in incompressible and compressible flow. Wings and bodies in three-dimensional unsteady flow. 3 hr. lec.
474. *Advanced Aerospace Structures I*. 3 hr. PR: A.E. 161 or consent. Stress analysis; deflection of trusses and beams. Statically indeterminate problems. Hardy cross moment distribution and slope deflection methods. Matrix methods of structural analysis; force and displacement methods. 3 hr. lec.
475. *Advanced Aerospace Structures II*. 3 hr. PR: A.E. 474 or consent. Principles in structural analysis, beam-column, sandwich beams and plates. Methods of obtaining exact and approximate solutions (Raleigh-Ritz, Galerkin, etc.). Buckling loads in compression. Stiffened panels, wrinkling in sandwich construction. Minimum weight design. Shells. 3 hr. lec.
497. *Research*. 1-15 hr.

AGRICULTURAL ENGINEERING (With Options in Forest Engineering)

Master of Science in Agricultural Engineering and Master of Science in Engineering programs are offered with areas of major emphasis in either Agricultural Engineering or Forest Engineering.

Before being admitted to graduate work in the Department of Agricultural Engineering, the prospective student must be admitted to the Graduate School. The student must comply with the rules and regulations as outlined in the general requirements for graduate work in the College of Engineering.

Candidates with a B.S.Ag.E. from an accredited curriculum may enroll for the M.S.Ag.E. degree. Candidates holding a baccalaureate degree in other fields of engineering or the physical sciences may enroll for the M.S.E. degree. These students must remove all undergraduate requirements that are prerequisite to their graduate programs.

A student is admitted to candidacy for the M.S.Ag.E. or M.S.E. degree only by formal written application after completing at least 9 credit hours of graduate work at WVU with a grade-point average of at least 3.0.

The areas of concentration available with major emphasis in Agricultural Engineering are:

1. *Power and Machinery* — Design and development of machines and equipment for agricultural industries. Physical properties of plants and animals as they relate to machine and equipment development.

2. *Electric Power and Processing* — Application of electricity to agriculture and processing of food and fiber from producer to consumer.

3. *Soil and Water Conservation* — Hydrology, drainage, erosion control and irrigation.

4. *Structures and Environment* — Design of structures, including functional requirements for plants and animals. Waste disposal and utilization.

The areas of concentration available with major emphasis in Forest Engineering are:

1. *Power and Machinery* — Hydraulic power. Design and development of machines for the forest industries.

2. *Industrial* — The system's approach and management of machines and equipment for production and harvesting forest products.

3. *Hydrology* — Conservation of soil and water and pollution control in forest areas.

Thesis. A thesis is normally required of all candidates for the M.S.Ag.E. or the M.S.E. degree. In most cases, it will be necessary to take 6 hours of research, Agricultural Engineering 497 or Forest Engineering 497. A thesis, however, is not automatically approved after the required number of semester hours of research work has been completed. The candidate may find that completion of the thesis for approval will delay the originally anticipated date of graduation. After satisfactory completion of the thesis and coursework, the candidate will be given an examination by the student's committee.

Thesis Supervisor. Each student will be assigned a thesis supervisor who will serve as chairperson of the student's graduate committee.

Agricultural Engineering

Ag.E.

201. *Farm Structures.* II. 3 hr. PR: M.E.M. 52. Design of structures for housing, recreation, agriculture, forestry, and related rural activities. Structural materials selection will be based on environmental and strength requirements, durability, economics and aesthetic values. 2 hr. rec., 3 hr. lab.

210. *Application of Electricity to Agriculture*. II. 3 hr. PR: E.E. 105. Design of systems using electrical energy in urban, rural and recreational applications. Electric power generation, safe wiring, lighting, heating, motors, control systems and their applications for air conditioning, water and material handling systems. 2 hr. rec., 3 hr. lab.
220. *Agricultural Process Engineering*. II. 3 hr. PR: C.E. 115, M.E.M. 140. Handling and processing of materials. Fluid flow, materials handling, shaping, and grading, heat and mass transfer, drying, refrigeration, processing instrumentation and controls, cost analysis and processing plant analysis. 2 hr. rec., 3 hr. lab.
230. *Farm Power*. I. 3 hr. PR: M.E.M. 140. Application of power sources to stationary and mobile equipment used in forestry and agriculture. Includes engines and power units, transmission, control, man-machine interface, environmental impact and energy input efficiency. 2 hr. rec., 3 hr. lab.
240. *Hydrology*. I. 3 hr. PR: C.E. 115. The hydrologic cycle with emphasis on precipitation and runoff as related to design of hydraulic structures, soil and water conservation, and flood control. 3 hr. rec.
250. *Soil and Water Conservation*. I. 3 hr. PR: C.E. 115. Principles and practices in the development, conservation, utilization and management of soil and water resources. 2 hr. rec., 3 hr. lab.
260. *Properties of Biological and Animal Materials*. II. 3 hr. PR: Biol. 1, M.E.M. 52 or consent. Physical properties of biological materials as related to harvesting, handling and transporting, conditioning, preserving and storing operations. Size, shape, density, moisture content, elastic and viscoelastic properties, strength and aerodynamic response. 2 hr. rec., 3 hr. lab.
280. *Agricultural Engineering Problems*. 1-3 hr. PR: Consent. Special problems relating to agricultural engineering.
290. *Elements of Machinery Design*. II. 3 hr. PR: M.E.M. 140. Analysis of design and management practices for agricultural and forestry production machinery. Traction and stability, power transmission systems, versatility, operational criteria, quality and safety. 2 hr. rec., 3 hr. lab.
340. *Problems in Hydrology*. I. 3 hr. PR: Ag.E. 240. Special problems in hydrograph analysis, hydrologic performance of small watersheds, erosion and sedimentation, hydro-meteorological studies, flood runoff and peak discharge, drought, river forecasting, frequency analysis of hydrologic data. 3 hr. rec.
341. *Physical Climatology*. II. 3 hr. PR: Consent. Physical principles underlying the variations and changes in climate, climatic controls, elements of microclimatology, engineering applications and uses of climatic data. 3 hr. rec.
491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of the student's program.
497. *Research*. I, II, S. 1-15 hr.
498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.
499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

Forest Engineering

For. Eng'g.

281. *Forest Roads*. I. 3 hr. PR: C.E. 1 or 5 or consent. Forest and rural earth-gravel roads. Aesthetic, planning, design, construction and maintenance procedures. Surveys, route selection, service standards, curves and grades, cuts and fills, drainage structures, and bridges. 3 hr. rec.
291. *Logging Systems*. II. 3 hr. PR: W. S. 130 or consent. The engineering and economic aspects of equipment for short- and long-wood logging systems. Equipment cost analysis, transportation systems, equipment specifications, accident control and safety. 3 hr. rec.
391. *Logging Systems Engineering*. I. 3 hr. PR: Math. 18 or consent. Theory and design of modern forest harvesting systems such as balloon logging, cableways, pipelines and conveyors. Design features of specialized forest harvesting machines and devices. Systems engineering approach to equipment utilization. 3 hr. rec.
392. *Hydraulic Power*. II. 3 hr. PR: Math. 18 or consent. Hydraulic control circuits and design practice, includes components and elements, hydraulic fluid properties, characteristics of control components, feedback control approach and a semester problem of a complete circuit design. 3 hr. rec.
491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. It is anticipated that each graduate student will present at least one seminar to the assembled faculty and graduate student body of his program.
497. *Research*. I, II, S. 1-15 hr.
498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.
499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

CHEMICAL ENGINEERING

Master of Science in Chemical Engineering

Master of Science in Engineering

Students must comply with the rules and regulations as outlined in general requirements for graduate work in the College of Engineering. The master's degree programs, as outlined in "A Guide to the Graduate Program in Engineering," are offered and administered by the Department of Chemical Engineering.

Normally all M.S. degree candidates are required to perform research and will follow a planned program which conforms to either of the following outlines:

1. A minimum of 30 semester credit hours, not more than 6 of which are in research leading to an acceptable thesis.
2. A minimum of 33 semester credit hours, not more than 3 of which are in research leading to an acceptable problem report.

Admission to the M.S.Ch.E. program is restricted to those holding a baccalaureate degree in chemical engineering or its equivalent. In unusual cases the faculty will consider a student petition to take a 36-hour design-oriented chemical engineering practice program.

The M.S.E. program is available to students holding baccalaureate degrees in other fields of engineering and the physical sciences who wish to pursue a broad interdisciplinary program relevant to the major graduate areas administered by the department.

Courses. The adviser, in conjunction with an advisory and examining committee to be assigned to each student, will be responsible for following departmental guidelines to determine specific courses appropriate to the student's program. These departmental guidelines are available on request.

Examination. A candidate shall be required to pass examinations which may be written, or oral, or both, covering both course material and the thesis or problem report, depending upon the program selected.

Doctor of Philosophy

A candidate for the degree of Doctor of Philosophy in the Interdisciplinary Ph.D. program must comply with the rules and regulations as outlined in "A Guide to the Graduate Program in Engineering" and the Graduate School, and any specific regulations required by the Department of Chemical Engineering. A program with a major in chemical engineering, designed to meet the needs and objectives of each student, will be developed in consultation with the student's adviser and advisory and examining committee.

The research work for a doctoral dissertation should show a high order of originality on the part of the student and must offer an original contribution to the field of engineering science. It must have good literary form and style, and must give a thorough survey of the prior art with acceptable standards of documentation. Upon completion of the dissertation, the candidate will be required to submit to an oral defense. This examination will be designed to establish the candidate's logic, critical ability, and reasoning power, and will be based upon the field covered by the dissertation.

Chemical Engineering

Ch.E.

- 224. *Process Development.* 3 hr. PR: Chem. 134, 144, Ch.E. 111 and 143. Development of process systems from the modified unit operations-unit process concept. Thermodynamics and kinetics in evaluation of system requirements and performance. 3 hr. rec.
- 231. *Mathematical Methods in Chemical Engineering.* 3 hr. PR: Math. 18. Classification and solution of mathematical problems important in chemical engineering. Treatment and interpretation of engineering data. Analytical methods for ordinary and partial differential equations including orthogonal functions and integral transforms. 3 hr. rec.
- 251. *Metallurgical Engineering.* 3 hr. PR: Physics 12. Principles of production of metals and alloys, plastic deformation of metals, corrosion, and metal failure. 3 hr. rec.
- 253. *Ceramic Engineering I.* 3 hr. PR: Physics 12. Characterization of ceramic systems. Study of internal structure and structure sensitive properties; liquid and solid solutions; rheology; mechanical, thermal, chemical, optical, and electrical properties. 3 hr. rec.
- 258. *Polymers and Polymer Technology.* 3 hr. PR or Conc.: Chem. 134. Polymers and their handling. Properties of macromolecules as influenced by molecular weight, polymerization methods, plastics technology, polymer engineering. 3 hr. rec.

270. *Strategy of Process Engineering*. 3 hr. PR: Ch.E. 111 or consent. Latest theories of process design and process optimization, proven through regular use by practicing engineers, are applied to the major problems of process engineering. 3 hr. rec.
280. *Chemical Engineering Problems*. 1-6 hr. For juniors, seniors, and graduate students. May be used to correct deficiencies preparatory to or following courses such as Ch.E. 170 and 171, or for students in other disciplines desiring to take only a portion of a course.
290. *Introduction to Nuclear Engineering*. 3 hr. PR: Junior standing. Introduction to fundamental principles and applications of nuclear technology in science and engineering fields. Studies of nuclear fission and the design and operation of nuclear reactor systems; uses of radioisotopes as power sources and in materials processing, testing, and medicine; health physics and radiation detection and shielding.
301. *Transport Phenomena*. 3 hr. PR or Conc.: Ch.E. 231, or equiv. Introduction to equations of change (heat, mass and momentum transfer) with a differential balance approach. Use in Newtonian flow, turbulent flow, mass and energy transfer, radiation, convection. Estimation of transport coefficients. 3 hr. rec.
307. *Distillation*. 2-5 hr. PR: Math. 18 and consent. Vaporization principles of separation of liquid mixtures, stream, batch, continuous, azeotropic, extractive, and molecular distillation. 3 hr. rec., 0-6 hr. lab.
323. *Advanced Process Development*. 3 hr. PR: Consent. Extended and generalized unit process and operation concepts; specialized synthetic methods; reaction mechanisms and their effects on equipment design and performance; properties, their evaluation, prediction and marketability; industrial toxicology and plant safety. 3 hr. rec.
330. *Process Dynamics and Control*. 3 hr. PR: Consent. Dynamic response of processes and control instruments. Use of Laplace transforms and frequency response methods in analysis of control systems. Application of control systems in chemical reactors, distillation, and heat transfer operations. Introduction to non-linear systems. 3 hr. rec.
344. *Thermodynamics*. 3 hr. PR: Consent. Logical development of thermodynamic principles. These are applied to selected topics including development and application of the phase rule, physical and chemical equilibria in complex systems, and non-ideal solutions. Introduction to non-equilibrium thermodynamics. 3 hr. rec.
345. *Chemical Reaction Engineering*. 3 hr. PR: Consent. Homogeneous reactions, batch and flow reactors, ideal reactors, macro and micro mixing, non-ideal flow reactors, heterogeneous reaction systems, catalytic and non-catalytic reactions, reactor stability analysis, reactor optimization. 3 hr. rec.
358. *Polymer Processing*. 3 hr. PR: Chem. 134 or consent. Analytical description of rheology, molding, extrusion, bonding, polymer modification operations, physical properties. 3 hr. rec.
370. *Process Equipment Design I*. 3 hr. PR: Ch.E. 301 or consent. Design, sizing, optimization, and cost estimation of equipment used for heat transfer, emphasis on design techniques, computer design techniques discussed where applicable.
371. *Process Equipment Design II*. 3 hr. PR: Ch.E. 301 or consent. Design, sizing, optimization, and cost estimation of equipment used for mass transfer operations, emphasis on practical aspects of equipment design, computer design techniques discussed where applicable. 3 hr. rec.
390. *Nuclear Reactor Systems I*. 3 hr. PR: Consent. Intended as a first course for graduate students in the area of power reactor systems analysis and design. Includes topics such as neutron interactions with reactor materials, fission, reactor physics, reactor heat generation and removal, and thermal reactor core design.
391. *Nuclear Reactor Systems II*. 3 hr. PR: Ch.E. 390. Continuation of Ch.E. 390. Reactor kinetics, nuclear power economics, and case studies and analyses of the following

reactor systems: pressurized-water, boiling-water, fast breeder, and gas-cooled power plants.

392. *Interaction of Radiation and Matter*. 1-3 hr. PR: Consent. Types of radiation, energy deposition by radiation, experimental instrumentation, formation and reactions of radiation-chemical species. 1-3 hr. rec.
400. *Chemical Engineering Seminar*. 1-6 hr. Fluidization, bioengineering, transport phenomena for biological systems, air and water pollution abatement, fast-reaction kinetics, radiation, nuclear power engineering, and direct energy conversion.
402. *Advanced Fluid Dynamics*. 3 hr. PR: Consent. Analysis of flow of fluids and transport of momentum and mechanical energy. Differential equations of fluid flow; potential flow, flow in porous media, laminar boundary layer theory, and non-Newtonian fluids. 3 hr. rec.
404. *Advanced Heat Transfer*. 3 hr. PR: Consent. Theory of transport of thermal energy in solids and fluids as well as radiative transfer. Steady and transient conduction; heat transfer to flowing fluids; evaporation; boiling and condensation; packed and fluid bed heat transfer. 3 hr. rec.
406. *Advanced Mass Transfer*. 3 hr. PR: Consent. Theory of diffusion, interphase mass transfer theory, turbulent transport, simultaneous mass and heat transfer, mass transfer with chemical reaction, high mass transfer rates, multicomponent macroscopic balances. 3 hr. rec.
432. *Optimization of Chemical Engineering Systems*. 3 hr. PR: Consent. Optimization in engineering design, unconstrained optimization and differential calculus, equality constraints optimization, search technique, maximum principles, geometric and dynamic programming, linear and non-linear programming, calculus of variations. 3 hr. rec.
446. *Catalysis*. 3 hr. PR: Ch.E. 345 or consent. Physical and chemical properties of catalytic solids, nature and theories of absorption, thermodynamics of catalysis, theories of mass and energy transport, theoretical and experimental reaction rates, reactor design and optimization. 3 hr. rec.
447. *Non-Catalytic Solid-Fluid Reactions*. 3 hr. PR: Ch.E. 345 or consent. Reaction models, pseudo-steady state approximation, effectiveness factor, transport and chemical reaction properties, geometric, thermal and transitional instabilities, simultaneous multiple reactions, selectivities in fixed, moving and fluidized bed reactor design. 3 hr. rec.
472. *Process Design and Development I*. 3 hr. PR: Ch.E. 301 or consent. Process development from inception to the final design, emphasis on economics and cost estimating at various stages of process development, relationship of research and development, engineering design and production, process optimization and computer design techniques. 3 hr. rec.
473. *Process Design and Development II*. 3 hr. PR: Ch.E. 472 or consent. Practice of process design using case studies method either with class or student teams, concurrent lectures on relevant subjects taught by specialists using team teaching concepts. 3 hr. rec.
480. *Advanced Independent Study*. 1-6 hr. PR: Consent. Designed to increase the depth of study in a specialized area of chemical engineering.
497. *Research*. 1-15 hr.

CIVIL ENGINEERING

Master of Science in Civil Engineering

Master of Science in Engineering

Students must comply with rules and regulations as outlined in general requirements for graduate work in "A Guide to the Graduate Program in Engineering." Each candidate will, with the approval and at the discretion of the graduate committee, follow a planned program which must conform to one of the following outlines:

1. A minimum of 30 semester credit hours, not more than 6 of which are in research leading to an acceptable thesis.
2. A minimum of 33 semester credit hours, not more than 3 of which are in research leading to an acceptable problem report.
3. A minimum of 36 semester credit hours, with no thesis or problem report required.

Courses. No rigid curriculum is prescribed for the degrees of Master of Science in Civil Engineering and Master of Science in Engineering. Graduate level work in mathematics, mechanics, or other appropriate areas of science is customary; however, at least 15 semester hours credit should normally be selected from graduate civil engineering courses.

Thesis or Problem Report. A thesis or problem report is normally required of all candidates. While required credit in research (C.E. 497) is devoted to the thesis or report preparation, the thesis or problem report is not automatically approved after the required number of semester hours of research work have been completed. The thesis or problem report must conform with the general requirements of the Graduate School and with any additional requirements established by the Department of Civil Engineering.

Final Examination. A candidate shall be required to pass an examination which may be written, oral, or both, to be administered by the student's advisory and examining committee. The examination shall cover course material and the thesis or problem report, depending upon the program followed.

Master of Science in Civil Engineering

Approval for the M.S.C.E. degree is restricted to those holding a baccalaureate degree in civil engineering.

Master of Science in Engineering

The M.S.E. program is available to the students approved for the graduate program who do not possess a baccalaureate degree in civil engineering. Students entering this graduate program must complete appropriate undergraduate work as specified by departmental regulations.

Doctor of Philosophy

The Doctor of Philosophy degree is administered through the College of Engineering Interdisciplinary Program. A candidate for the degree of Doctor of Philosophy must comply with the rules and regulations as outlined in general requirements for graduate work in "A Guide to the Graduate Program in Engi-

neering." A program designed to meet the needs and objectives of each student will be developed in consultation with the student's committee.

The research work for the doctoral dissertation must show a high degree of originality on the part of the student and must constitute an original contribution to the art and science of civil engineering. The dissertation must have good literary form and style and must present a thorough review of the prior study in the subject with acceptable standards of documentation. The candidate is required to take a final oral examination upon completion of the dissertation. This examination is designed to permit the candidate to demonstrate ability to present and defend the work orally in a logical manner.

Civil Engineering

C.E.

- 212. *Concrete and Aggregates.* 3 hr. PR: C.E. 110 or consent. Considerations and methods for the design of concrete mixes. Properties of portland cement and aggregates and their influence on the design and performance of concrete mixtures. Test methods for concrete and aggregates and the significance of these tests. 2 hr. rec., 3 hr. lab.
- 213. *Construction Methods.* 3 hr. PR: C.E. Senior standing. Study of construction methods, equipment, and administration with particular emphasis on the influence of new technology developments. 3 hr. rec.
- 222. *Open Channel Flow.* 3 hr. PR: C.E. 120. Hydraulic problems associated with natural waterways, man-made waterways, and design of hydraulic structures of open channels. 3 hr. rec.
- 232. *Principles of Transportation Engineering.* 3 hr. PR: C.E. 131 or consent. Basic approach to the problem of integrated transportation systems from standpoint of assembly, haul, and distribution means. Analysis of the characteristics of the transport equipment and traveled way. Power requirements, speed, stopping, capacity costs, economics of location and route selection. Future technological developments and innovations. 3 hr. rec.
- 235. *Railway Engineering.* 3 hr. PR: C.E. 101. Development and importance of the railroad industry. Principles of location, construction, operation, and maintenance. 3 hr. rec.
- 251. *Public Health Engineering.* 3 hr. PR: C.E. 146 or 147 or consent. Engineering aspects involved in control of the environment for the protection of health and promotion of comfort of man. Communicable disease control, milk and food sanitation, air pollution, refuse disposal, industrial hygiene, and radiological health hazards. 3 hr. rec.
- 252. *Water Resources Engineering.* 3 hr. PR: C.E. 120. Design of water-resources systems. The interrelationship between economic objectives, engineering analysis, and government agencies. 3 hr. rec.
- 260. *Structural Analysis II.* 3 hr. PR: C.E. 160. Fundamental theory of statically indeterminate structures. General theory of continuity and iterative and energy methods applied to the analysis of indeterminate beams and frames. 3 hr. rec.
- 270. *Structural Design I.* 3 hr. PR: C.E. 169 or consent. Theory and design of reinforced concrete members. Design considerations for concrete bridges and buildings. 2 hr. rec., 3 hr. lab.
- 271. *Structural Design II.* 3 hr. PR: C.E. 169 or consent. Design of steel bridge and building structures. Welded, riveted, and bolted connections; simple and moment-resistant connections; cost estimates. 2 hr. rec., 3 hr. lab.
- 281. *Foundations Engineering.* 3 hr. PR: C.E. 180. Soils exploration and the design and analysis of engineering foundations. Emphasis on earth pressures and design of

retaining walls, studies of bracing systems, and the elements of shallow and deep foundations for bridges and buildings. Movement of water through soil structures and control of water in excavations. 3 hr. rec.

291. *Comprehensive Project for Civil Engineers*. 3 hr. PR: Senior standing or consent. Application of civil engineering principles, through group studies, to develop a solution for a comprehensive engineering problem. Consideration given to a problem involving all aspects of civil engineering. 2 hr. rec., 3 hr. lab.
307. *Photogrammetry*. 3 hr. PR: C.E. 101. Geometry and interpretation of aerial photography; flight planning; radial-line control; principles of stereoscopy; plotting instruments. 2 hr. rec., 3 hr. lab.
308. *Geodesy*. 3 hr. PR: C.E. 101. Precise base line measurements, triangulation and leveling, geodetic astronomy; figure of the earth, map projections; rectangular coordinate systems; least squares adjustment; gravity. 3 hr. rec.
310. *Bituminous Materials and Mixtures*. 3 hr. PR: C.E. 110 or consent. Manufacture, testing, and nature of bituminous materials. Principles of the design and behavior of bituminous mixtures including the influence of aggregates, temperature, and other variables on the design for stability and durability. Significance of test methods and specifications. Construction practice. 2 hr. rec., 3 hr. lab.
311. *Pavement Design*. 3 hr. PR: C.E. 110, 180. Effects of traffic, soil, environment, and loads on the design and behavior of pavement systems. Design of flexible and rigid pavements, bases, and sub-bases. Consideration of drainage and climate. Pavement performance and performance surveys. 3 hr. rec.
332. *Airport Planning and Design*. 3 hr. PR: C.E. 131 or consent. Airport financing, air travel demand modeling, aircraft trends, air traffic control, site selection, ground access, noise control, geometric design, pavement design, and terminal facilities. 3 hr. rec.
333. *Geometric Design of Highways*. 3 hr. PR: Consent. The theory and practice of geometric design of modern highways. Horizontal and vertical alignment, cross-slope, design speed, sight distances, interchanges, and intersections. Critical analysis of design specifications. 2 hr. rec., 3 hr. lab.
334. *Introduction to Traffic Engineering*. 3 hr. PR: C.E. 131. The purpose, scope, and methods of traffic engineering. Emphasis on the three basic elements of the transportation system, i.e. the human, vehicle, and roadway. Characteristics of each element and interactions between the elements. Laboratory devoted to conducting simple traffic studies, solving practical problems, and designing traffic facilities. 2 hr. rec., 3 hr. lab.
345. *Properties of Air Pollutants*. 3 hr. PR: Consent. Physical, chemical, biological, and social behavioral properties of dusts, droplets, and gases in the atmosphere. Air pollutant sampling and analysis. Planning and operating air pollution surveys. 2 hr. rec., 3 hr. lab.
349. *Solid Waste Disposal*. 3 hr. PR: Consent. Study of traditional patterns and problems of solid waste storage, transport, and disposal. Examination of various engineering alternatives with appropriate consideration for air and water pollution control and land reclamation. Analytical approaches to recovery and reuse of materials. 2 hr. rec., 3 hr. lab.
350. *Sanitary Chemistry and Biology*. 3 hr. PR: C.E. 147 or consent. Study of physical and chemical properties of water. Theory and methods of chemical analysis of water, sewage, and industrial wastes. Biological aspects of stream pollution problems. 2 hr. rec., 3 hr. lab.
356. *Principles of Biological Waste Treatment*. 3 hr. PR: C.E. 350 or consent. Examination of biological systems used in waste treatment as to ecology and function. Models used to describe system behavior are developed. Laboratory experiments

performed to understand operation and design of treatment plants. 2 hr. rec., 3 hr. lab.

- 359. *Basic Radiological Health*. 3 hr. PR: Consent. Fundamentals theory and terminology. Environmental and occupational hazards in the nuclear field. Radioactive waste disposal. Laboratory measurements of radioactivity. 2 hr. rec., 3 hr. lab.
- 361. *Statically Indeterminate Structures*. 3 hr. PR: C.E. 260 or consent. Advanced topics in indeterminate structural analysis for trusses, nonprismatic members and frames. 3 hr. rec.
- 363. *Introduction to Structural Dynamics*. 3 hr. PR: Math. 18 and C.E. 361 or 460. General theory for dynamic response of systems having one or several degrees of freedom. Emphasis on the application of dynamic response theory to structural design. 3 hr. rec.
- 372. *Plastic Design of Steel Structures*. 3 hr. PR: C.E. 260, 271, or consent. The fundamental concepts of inelastic behavior in steel. Analysis of structures for ultimate load. The influence of axial forces, shear forces, and local buckling on the plastic moment. Study of structural connections and deflections. Steel structures design. 3 hr. rec.
- 373. *Prestressed Concrete*. 3 hr. PR: C.E. 270 or consent. The analysis and design of determinate and indeterminate prestressed beams and frames. 3 hr. rec.
- 374. *Timber Design*. 3 hr. PR: C.E. 160 and For. 261 or consent. Emphasis on fundamentals of modern timber design and analysis. Topics include a review of wood properties, design of beams, columns, arches, trusses, and pole structures using dimensional lumber, glue-laminated and plywood components. Detailed study of connections using nails, shear connectors, and adhesives. 3 hr. rec.
- 380. *Soil Properties and Behavior*. 3 hr. PR: C.E. 180 or consent. Soil mineralogy and the physico-chemical properties of soils and their application to an understanding of the behavior of soils. A detailed review of the basic and classical theories of permeability, consolidation, shear strength, and compaction. Prediction of engineering behavior of soils in light of physico-chemical concepts. 3 hr. rec.
- 381. *Soil Testing*. 3 hr. PR: C.E. 180 or consent. Complements and expands the material covered in C.E. 380 from an experimental standpoint. Experimental studies conducted to demonstrate empirical and theoretical principles. Emphasis on the proper interpretation of experimental results and application of such results to practical problems. 1 hr. rec., 6 hr. lab.
- 421. *Hydraulic Structures*. 3 hr. PR: C.E. 120 or consent. Hydraulic analysis and design of engineering structures such as reservoirs, dams, spillways, gates, and outlet works. Study of hydraulic machinery, irrigation, hydroelectric power, drainage, and flood control. 3 hr. rec.
- 422. *Surface and Subsurface Drainage*. 3 hr. PR: Consent. Nature and requirements of drainage studies and drainage design as they pertain to transportation facilities. Emphasis on the theory of drainage design and a critical analysis of drainage practices. 3 hr. rec.
- 430. *Highway Laws*. 3 hr. PR: Consent. Highway laws with emphasis on aspects particularly related to planning functions, such as reservation of right-of-way, access control, eminent domain, systems classification, and the basis for the existence and operation of various planning agencies. 3 hr. rec.
- 431. *Traffic Flow Theory*. 3 hr. PR: I.E. 213 and C.E. 438 or consent. Basic concepts of quantitative analysis of traffic systems. Probability theory, queuing theory, pedestrian and traffic delay at traffic signals, turning at intersections, parking problems, merging traffic on two-lane roads, simulation of traffic problems. 3 hr. rec. (Also listed as I.E. 431.)
- 432. *Highway Economics and Administration*. 3 hr. PR: Consent. Methods of financing highways, including federal participation. Establishing allocation of highway cost

and determination of economic justification of routes. Analysis of highway administrative organizations. 3 hr. rec.

- 434. *Urban Problems*. 3 hr. PR: Consent. Problems of transportation in the urban area as they relate to general development of the city. Emphasis on the engineer in planning for urban transportation and relationship of engineer to the city planner and city administration. 3 hr. rec.
- 436. *Highway Planning I*. 3 hr. PR: Consent. Planning programs and methods including highway needs studies, priority rating systems, and programming methods. Consideration of traffic assignment and forecasting techniques. Devoted primarily to rural route problems. Case history method of study utilized. 3 hr. rec.
- 437. *Highway Planning II*. 3 hr. PR: C.E. 436. Continuation of C.E. 436 with special attention to urban locations and planning. 3 hr. rec.
- 438. *Traffic Engineering Characteristics*. 3 hr. PR: C.E. 131 or consent. Analysis of basic characteristics of drivers, vehicles, and roadway that affect the performance of road systems. Studies of volumes, speeds, delays, intersections, interchanges, capacity, and accidents will be considered. Techniques of traffic engineering measurements, investigations, and data analysis, including laboratory practice. 2 hr. rec., 3 hr. lab.
- 439. *Traffic Engineering Operations*. 3 hr. PR: C.E. 438. Theory and practice of application of traffic engineering regulations, traffic flow theory, design and use of traffic control devices and signal systems. Traffic administration and parking control. 3 hr. rec.
- 446. *Air Pollution Control Engineering*. 3 hr. PR: C.E. 345 or consent. Study of engineering alternatives in achieving various degrees of air pollution control. Factors considered in selection and specification of dust and gas collectors and convertors for various types of operations, and use of alternate process methods and process materials. 2 hr. rec., 3 hr. lab.
- 447. *Air Pollution Control Standards*. 3 hr. PR: C.E. 446 or consent. Comparative study of technical, economical, and social factors used in developing and establishing air pollution standards, criteria, and control limitations. Relationships between process design specifications, pollutant emission limitations, ambient air pollution effects on people and objects, air quality standards, and emission performance limitations. 2 hr. rec., 3 hr. lab.
- 448. *Air Pollution Control Programs*. 3 hr. PR: C.E. 446 or consent. Examination of air pollution control programs of industries and government. Rationales and patterns of organization structure and operating administrative factors, including intra-office and inter-office and other group relationships. Significance of relationship with land use planning, solid waste, fire prevention, water pollution control, building inspection, and economic development agencies. 3 hr. rec.
- 452. *Water Treatment Theory*. 3 hr. PR: C.E. 350. Theory of various procedures and techniques utilized in treatment of water for municipal and industrial use. Review of water quality criteria. Design of water purification facilities. 2 hr. rec., 3 hr. lab.
- 454. *Industrial and Advanced Waste Treatment*. 3 hr. PR or Conc.: C.E. 350 or consent. Basic physical and chemical operations used in industrial and advanced waste treatment; applications for waste water reclamation and reuse; study of industrial wastes from standpoint of process, source, and treatment. 3 hr. rec.
- 455. *Municipal and Industrial Design of Solid Wastes Disposal Operations*. 3 hr. PR: C.E. 349 or consent. Design criteria of existing methods and equipment for disposal of solid wastes generated by industry and municipalities: on-site preparation; volume and density modification; and reclamation of marketable materials. Process, source, treatment, and final disposal with considerations of waste reclamation and reuse of available energy. 3 hr. rec.

457. *Hydraulics of Sanitary Engineering Works*. 3 hr. PR: C.E. 120. Techniques of population growth estimation, rainfall and runoff analysis, food flow, and ground water data to the design of sanitary works. Design of water distribution and sewerage systems. 2 hr. rec., 3 hr. lab.
458. *Design of Sanitary Works*. 3 hr. PR: C.E. 120. Water supply and waste water disposal problems. Design of treatment facilities. 2 hr. rec., 3 hr. lab.
460. *Statically Indeterminate Structures*. 3 hr. PR: C.E. 260 or consent. General theory of continuity, iterative, and classical methods of analysis of skeletal structures with emphasis on the influence coefficient method. 3 hr. rec.
461. *Bridge Engineering*. 3 hr. PR: C.E. 361 or consent. Statically indeterminate trusses, continuous trusses; steel and concrete arches; long-span and suspension bridges; secondary stresses. 3 hr. rec.
462. *Numerical Methods of Structural Analysis*. 3 hr. PR: C.E. 361 or 460. Methods of successive approximations and numerical procedures for solution of structural problems. Application of these procedures to analysis of bridges and builders. 3 hr. rec.
470. *Behavior of Steel Members*. 3 hr. PR: C.E. 271 or consent. Elastic behavior of steel members subjected to axial load, bending, and torsion. Elastic and inelastic response of beams, columns, and beam-columns to load and the resulting design implications. Comparison with standard steel codes and specifications. 3 hr. rec.
471. *Light Gage Metal Design*. 3 hr. PR: C.E. 260, 271, or consent. Analysis and design of light gage metal systems; flexural and compression members design; investigations into post buckling strength and optimum weight systems. 3 hr. rec.
473. *Structural Design for Dynamic Loads*. 3 hr. PR: C.E. 363 or consent. Nature of dynamic loading caused by earthquakes and nuclear weapons blasts; nature of dynamic resistance of structural elements and structural systems; criteria for design of blast-resistant and earthquake-resistant structures; simplified and approximate design methods. 3 hr. rec.
474. *Behavior and Advanced Design of Timber Structures*. 3 hr. PR: C.E. 260, 374, Wood Sci. 261 or consent. Study of the behavior and analysis of structural systems and components fabricated from timber. Behavior of timber members subjected to bending, shear, and compression, impact, and vibration. Evaluation of the time dependent characteristics of timber members under load. Analysis and design of special timber structures including lamella roofs, stressed skin and prestressed members, and space frames. 3 hr. rec.
475. *Analysis and Design of Multistory Structures*. 3-6 hr. PR: C.E. 270, 271. Theories of action of beams, slabs, and columns of reinforced concrete or steel; review of standard codes and specifications and their influence on design. 3 hr. rec.
476. *Behavior of Reinforced Concrete Members*. 3 hr. PR: C.E. 270 or consent. Studies of the actual behavior and strength of reinforced concrete members by critically reviewing experimental and analytical investigations. Beams subjected to pure flexure; columns subjected to axial compression; combined flexure and compression; combined flexure, shear, and bond. 3 hr. rec.
477. *Behavior of Reinforced Concrete Structures*. 3 hr. PR: C.E. 476. Continuation of C.E. 476. Studies of behavior and strength of statically indeterminate reinforced concrete structures. Comparison with reinforced concrete codes and specifications. 3 hr. rec.
478. *Thin Shell Roof Structures I*. 3 hr. PR: Math. 113, C.E. 361 or consent. Development and solution of the fundamental elastic equations for barrel vault roofs using matrix algebra. Effects of edge members upon the strength and stiffness of barrel vault roofs. Design of simple shell structures. 3 hr. rec.
479. *Thin Shell Roof Structures II*. 3 hr. PR: C.E. 478 or consent. Continuation of C.E. 478. Analysis of multiple cylindrical shells using the theory of elasticity and matrix

algebra. Ultimate load and variational methods in shell analysis. Design and analysis of doubly curved shells. 3 hr. rec.

- 480. *Geotechnic*. 3 hr. PR: Consent. A presentation of a unified approach to the various aspects of soil formation and the influence of the formative factors on the nature of soils and their use as engineering materials. Presented cooperatively with the Department of Agronomy and the Department of Geology. 3 hr. rec.
- 482. *Foundations Engineering*. 3 hr. PR: C.E. 380 or consent. Application of the principles of theoretical soil mechanics to the design of shallow and deep foundations. Detailed attention is given to methods of subsurface exploration, spread footings and mats, pile foundations, retaining walls, sheet pile structures and braced cofferdams. Particular emphasis is given to economy and performance in the selection of foundation treatment. 3 hr. rec.
- 483. *Earthwork Design*. 3 hr. PR: C.E. 380 or consent. Application of the principles of theoretical soil mechanics to the design of embankments of earth and rock. Detailed attention is given to compaction methods and equipment, stability of natural and man-made slopes, embankment foundation stability and design of earth and rock-fill dams. 3 hr. rec.
- 484. *Groundwater and Seepage*. 3 hr. PR: Consent. Flow of groundwater through soils and its application to the design of highways and dams and to construction operations. Particular emphasis is placed on the analytical solution of seepage problems. The classical flow net techniques for solving seepage problems also are given detailed consideration. 3 hr. rec.
- 485. *Airphoto Interpretation*. 3 hr. PR: Graduate standing. A study of airphoto interpretation techniques to obtain qualitative information concerning the extent, type, and engineering characteristics of surficial materials. Emphasis will be placed on the use of airphoto interpretation for the location of construction materials and the evaluation of engineering problems associated with the different materials that are encountered in the design and location of engineering facilities.
- 486. *Soil Dynamics*. 3 hr. PR: C.E. 380 and consent. Fundamental behavior of soils subjected to dynamic loads produced by explosion effects, earthquake effects, and foundation vibrations. Particular emphasis is placed on the stress-strain-time behavior of soils for conditions of rapid stress or strain change. Consideration is given to wave propagation resulting from ground motions. Theories of vibration of a mass resting on an elastic half-space are applied to foundations vibration problems. 3 hr. rec.
- 490. *Teaching Practicum*. 1-3 hr. PR: Consent. Supervised practices in college teaching of civil engineering.
- 491. *Advanced Study*. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
- 495. *Seminar*. PR: Consent. Studies and group discussion of structural fluid mechanics, surveying, transportation, soil mechanics and foundations, and sanitary problems.
- 496. *Graduate Seminar*. 1 hr. PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his program.
- 497. *Research*. 1-15 hr.
- 498. *Thesis*. 2-4 hr. PR: Consent.
- 499. *Graduate Colloquium*. 1-6 hr. PR: Consent. For graduate students not seeking coursework credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural program.

ELECTRICAL ENGINEERING

The Department of Electrical Engineering is authorized to admit students to the degree programs of the Master of Science in Electrical Engineering (M.S.E.E.) and the Master of Science in Engineering (M.S.E.). It also participates in the College of Engineering interdisciplinary Ph.D. degree program. Graduate students in the Department of Electrical Engineering must comply with the rules of the Graduate School and with the requirements specified in "A Guide to the Graduate Program in Engineering."

Master of Science in Electrical Engineering

Master of Science in Engineering

Course Requirements. All M.S. degree candidates will be required to meet the following minimum requirements:

1. E.E. 325 — Advanced Linear Circuit Analysis3 hr. (min.)
2. Selected courses offered outside the Electrical Engineering Department to provide analytical techniques supporting the student's graduate program. (For example: Math., Statistics, etc.).....6 hr. (min.)
3. Electrical Engineering courses on the 300 or 400 level (other than E.E. 496 and 497).....9 hr. (min.)

Each M.S. degree candidate will be required to make an oral presentation of the thesis or problem research to a graduate seminar which will be given near the conclusion of the student's research but before scheduling the final examination.

Students with deficiencies in their undergraduate program may be required to take some electrical engineering or mathematics courses as prerequisites for graduate courses. These deficiencies are usually noted as a condition for admission. However, they may also be specified as a result of the entrance interview. If these courses are normally required for the B.S.E.E. at WVU, they will not be accepted for credit in an M.S. degree program unless specifically approved by the student's Advisory and Examining Committee.

Entrance Interview. All students beginning graduate study in electrical engineering will be given an entrance interview. The interview determines if a student is adequately prepared to pursue a graduate degree program and aids the faculty in advising the student. As a result of the interview, the student and the committee should prepare a mutually acceptable preliminary plan of study.

Thesis. Normally a thesis is required of all M.S. candidates in electrical engineering. Approval by the Advisory and Examining Committee is necessary before the thesis will be accepted. The thesis must be presented in a form that conforms to general requirements of the Graduate School, and should conform to additional thesis requirements of the department.

Final Examination. Each candidate for the M.S. degree shall pass a final examination administered by the student's Advisory and Examining Committee. This examination may be written or oral, or both, and shall cover the course materials and defense of the thesis or report when applicable.

Master of Science in Electrical Engineering

Students may be admitted to the M.S.E.E. program if they hold a baccalaureate degree in electrical engineering or its equivalent. Students who lack this requirement may either make up the necessary undergraduate course work or may apply for admission to the M.S.E. program with emphasis in electrical engineering.

Master of Science in Engineering

The M.S.E. program is available to students who are interested in graduate work in electrical engineering but who hold a baccalaureate degree from another discipline. Students with a baccalaureate degree from another field of engineering or from one of the sciences should contact the Department of Electrical Engineering for further information. In general, a student in the M.S.E. program will not be asked to complete all of the requirements equivalent to the B.S.E.E. degree. However, all graduate students will be required to meet the prerequisites for each course taken for credit.

Doctor of Philosophy

Students interested in electrical engineering and who wish to pursue the Ph.D. degree should contact the department for information about the interdisciplinary Ph.D. program in engineering. While it is possible for a student with only a B.S. degree to enroll directly in the Ph.D. program, it is usually advisable for the student to earn an M.S. degree first. Students in the Ph.D. program must comply with the rules and regulations outlined in the general requirements for graduate work in engineering and the interdisciplinary Ph.D. degree as stated in "A Guide to the Graduate Program in Engineering."

A typical Ph.D. program will take between three and four years beyond the baccalaureate degree. The courses chosen for a given student's program are selected to accomplish three objectives: (1) develop the student's expertise in his area of interest, (2) strengthen the student's knowledge of other areas that will support the student's research endeavors, and (3) satisfy the Interdisciplinary curriculum requirements of the College. A possible outline for a Ph.D. program is given below:

First Year — M.S. degree

Second Year —

- (a) An approved plan of study consisting mainly of courses in the 300 and 400 series.
- (b) Admission to candidacy for the Ph.D. degree
 - (1) Pass written and oral comprehensive examinations
 - (2) Successfully defend research proposal
 - (3) Complete all program requirements set by his advisory and examining committee.

Third Year —

- (a) Complete research and write dissertation.
- (b) Defend dissertation in final examination.

The research work for the doctoral dissertation is expected to represent a significant contribution to engineering. It may entail a fundamental investiga-

tion into a specialized area or a broad and comprehensive system analysis or design. In either case, a high degree of creative effort and independence is required to meet the standards of acceptability.

Electrical Engineering

E.E.

- 200.* *Seminar*. (Credit). PR: Senior standing. Special material and projects.
- 201.* *Electronics for Scientists*. 3 hr. PR: General physics and elementary calculus or consent. Special course for chemists, physicists, medical researchers, and other research workers having a limited background in electronics. Electrical and electronic fundamentals. Application of electronic instrumentation and electrical signal processing. (Not normally open to Engineering students.) 2 hr. rec., 3 hr. lab.
216. *Fundamentals of Control Systems*. 3 hr. PR: E.E. 126. Fundamental concepts of feedback control system analysis; stability, and design in the frequency, complex variable, and time domains. Includes Nyquist, root locus and state variable concepts. Mitrovic's method and Chen's method. 3 hr. rec.
- 218.* *Engineering Analysis and Design*. 3 hr. PR: E.E. 130, 150, 200. Application of the method of engineering analysis based upon fundamental physical laws, mathematics, and practical engineering consideration. Emphasis on the professional approach to analysis of engineering problems. 3 hr. rec.
230. *Electrical Power Distribution Systems*. 3 hr. PR: E.E. 131 or consent. Analysis of polyphase systems in unbalanced and transient conditions. 3 hr. rec.
231. *Electrical Power Systems I*. 3 hr. PR: E.E. 131 or consent. Analytical methods for steady-state performance of power systems. 3 hr. rec.
234. *Power System Stability*. 3 hr. PR: E.E. 231 or consent. An introduction to power stability. 3 hr. rec.
244. *Introduction to Antennas and Radiating Systems*. 3 hr. PR: E.E. 141 or consent. Radiation from current distributions, linear antennas, far field approximations, field equivalence theorems, aperture antennas, antenna arrays, patterns, and gain, and application to specific antenna types. 3 hr. rec.
245. *Microwave Circuits and Devices*. 3 hr. PR: E.E. 141. UHF transmission line theory, impedance matching techniques and charts, general circuit theory of one port and multiports for waveguiding systems, impedance and scattering matrices, waveguide circuit elements, microwave energy sources. Course will be supplemented by laboratory problems. 3 hr. rec.
252. *Electronics III*. 3 hr. PR: E.E. 154. Linear integrated circuit building blocks applied to such functions as amplification, controlled frequency response, analog-digital conversion, sampling, and waveform generation. 3 hr. rec.
253. *Physical Electronics I*. 3 hr. PR: E.E. 150 or equiv. Properties of semiconductors and electrical conduction processes in solids. Applications of these principles in determining the characteristics of discrete electronic devices. Introduction to lasers. 3 hr. rec.
257. *Transistor Circuits*. 3 hr. PR: E.E. 152 or equiv. Analysis and design of multistage transistor amplifiers. Methods of handling the interaction between stages. Gain and bandwidth of multistage low-pass and tuned amplifiers. Feedback amplifiers. 3 hr. rec.
264. *Introduction to Communications Systems*. 3 hr. PR: E.E. 126. Introduction to the first principles of communication system design. Analysis and comparison of standard analog and pulse modulation techniques relative to band-width, noise,

*Courses indicated will not usually apply for credit toward a graduate degree in Electrical Engineering.

threshold, and hardware constraints. Communication systems are treated as opposed to individual circuits and components of the system. 3 hr. rec.

271. *Theory of Digital Computers*. 3 hr. PR: Consent. Introduction to the field of digital computer design. Topics include general computer organization, number systems and number representations, Boolean algebra and its application to computer design, and characteristics of major parts of a computing system. 3 hr. rec.
275. *Pulse Techniques*. 3 hr. PR: E.E. 152. Introduction to the response of electrical networks to non-sinusoidal inputs, analysis of active networks with large signals and circuits and techniques used in pulse and digital equipment. Students use the University's computing facilities by solving problems using ECAP. No previous programming is needed. 2 hr. rec., 3 hr. lab.
278. *Analogue Computers*. 3 hr. PR: Math. 18. Theory and operation of analogue computers. Amplitude scaling and time scaling on the computer and application of computer to solution of differential equations. 3 hr. rec.
280. *Electrical Problems I*. 1-3 hr. For junior, senior, and graduate students.
312. *Feedback System Theory*. 3 hr. PR: E.E. 216, 325. Signal flow graphs; sensitivity; return difference; mathematical definition of feedback; effects of feedback; multiple loop systems; multivariate systems. 3 hr. rec.
315. *State Variable Analysis of Systems*. 3 hr. PR: Consent. Matrix theory and linear transformations as applied to linear control systems. The state-space on time-domain study of stability, controllability, observability, etc. 3 hr. rec.
316. *Synthesis of Feedback Systems I*. 3 hr. PR: E.E. 312, 364. Methods of direct synthesis and optimization of feedback systems; Wiener theory; Pontryagin's maximum principle; dynamic programming; adaptive feedback systems. 3 hr. rec.
325. *Advanced Linear Circuit Analysis*. 3 hr. PR: Consent. Systematic formulation of circuit equations. Use of operational techniques to find total solutions. Applications and characteristics of the Laplace and Fourier transforms, matrix algebra, complex variable theory and state variables are made to circuit analysis and elementary circuit synthesis. 3 hr. rec.
328. *Modern Network Synthesis*. 3 hr. PR: E.E. 325 or consent. Two-terminal network synthesis; Brune and Bott-Duffin synthesis; four-terminal networks; modern filter synthesis; Darlington synthesis, transfer-function synthesis; ladder and lattice syntheses; potential analogy and approximation problems. 3 hr. rec.
330. *Advanced Electrical Machinery*. 3 hr. PR: E.E. 131 or consent. Mathematical description of a synchronous machine; steady-state, balanced synchronous operation; three-phase short-circuit analysis; single-phase short-circuit analysis; double-line-to-ground short circuit and sequential faults; short-circuit torques; starting torque; voltage dip, synchronizing phenomena and sustained oscillations. 3 hr. rec.
331. *Electrical Power Systems II*. 3 hr. PR: E.E. 231 or consent. Electrical transients on power systems including traveling waves due to lightning and switching. Principles of lightning protection. 3 hr. rec.
333. *Application of Digital Computers to Power System Analysis. I*. 3 hr. PR: E.E. 231 or consent. Incidence and network matrices; algorithms for their formation; three-phase networks; short-circuit calculations; load-flow studies. 3 hr. rec.
340. *Electromagnetic Fields and Guided Waves I*. 3 hr. PR: E.E. 141 or equiv. Plane waves in dielectrics, conducting, and anisotropic media; polarization; radiation; duality; uniqueness; image theory; equivalence principle; Green's functions; integral equations; plane wave functions. 3 hr. rec.
350. *Electronic Circuits*. 3 hr. PR: E.E. 154 or equiv. Analysis and design of electronic circuits; low-pass and band-pass amplifiers, single-tuned and double-tuned stages, equal ripple and maximally flat responses. 3 hr. rec.

353. *Physical Electronics II*. 3 hr. PR: E.E. 154 or equiv. Semiconductor surfaces; surface states, space charge and the field effect. 3 hr. rec.
357. *Linear Integrated Circuits*. 3 hr. PR: E.E. 154 or equiv. Techniques of integrated circuit design and fabrication. Development of models descriptive of linear and nonlinear transistor operation. Design and analysis of high-frequency tuned, dc, and differential amplifiers. Primarily for students specializing in communication and electronics. 3 hr. rec.
358. *Integrated Logic Circuits*. 3 hr. PR: E.E. 154 or equiv. or consent. Techniques of integrated circuit design and fabrication. Development of transistor model for non-linear operation. Design, analysis, and comparison of emitter-coupled, direct-coupled, diode-transistor, and transistor-transistor integrated logic circuits. Intended for students specializing in digital circuits. 3 hr. rec.
364. *Communication Theory*. 3 hr. E.E. 264 or consent. Detailed study of probability theory and its use in describing random variables and stochastic processes. Emphasis on applications to problems in communication system design. 3 hr. rec.
366. *Information Theory I*. 3 hr. PR: E.E. 364. Probability concepts; theory of discrete systems; encoding; theory of continuous systems; systems with memory; the fundamental theorem of information theory. 3 hr. rec.
370. *Switching Circuit Theory I*. 3 hr. PR: E.E. 271 or equiv. The course presumes an understanding of the elements of Boolean or switching algebra. A study of both combinational and sequential switching circuits with emphasis on sequential networks. Advanced manual design and computer-aided-design techniques for single and multiple output combinational circuits are covered initially. Analysis and design of sequential circuits. Detection and prevention of undesired transient outputs. 3 hr. rec.
373. *Design of Computer Arithmetic Circuits I*. 3 hr. PR: E.E. 271 or equiv. Detailed study of computer circuitry usable in performing binary arithmetic. Logic, circuitry, and engineering aspects of digital computer equipment design. Primary emphasis on design of high speed, parallel arithmetic units using the natural binary number system. Analysis of systems for representing negative numbers. Study of various means for obtaining high speed addition, subtraction, and multiplication. 3 hr. rec.
374. *Design of Computer Arithmetic Circuits II*. 3 hr. PR: E.E. 373. Continuation of E.E. 373. High speed binary division, floating point arithmetic, modular or residue arithmetic, and techniques for checking arithmetic are covered. Recent innovations studied as literature becomes available. 3 hr. rec.
380. *Electrical Problems II*. 1-6 hr. For graduate students.
390. *Advanced Independent Study*. 1-6 hr. PR: Consent. Individual investigation in advanced electrical engineering subjects not covered in formal courses.
400. *Seminar*. 0-3 hr. PR: Consent
411. *Nonlinear Control System Analysis*. 3 hr. PR: Consent. Application of Liapunov's and Popov's methods to nonlinear control systems, together with classical techniques. 3 hr. rec.
413. *Sample-Data Control Systems*. 3 hr. PR: E.E. 312 or consent. A study of control systems in which the activating signal is represented by samples at regular time intervals. 3 hr. rec.
416. *Synthesis of Feedback Systems II*. 3 hr. Continuation of E.E. 316. 3 hr. rec.
430. *Real-Time Control of Electrical Power Systems*. 3 hr. PR: E.E. 231 or consent. Application of computers and modern control theory for reliable and economic real-time operation of integrated power systems. 3 hr. rec.

432. *Protection of Power Systems*. 3 hr. PR: E.E. 231 or consent. Principles of relay protection for faults on transmission lines and other devices. Use of overcurrent, differential, distance, and pilot relaying systems. Special relay applications. Determination of short-circuit currents and voltages from system studies. 3 hr. rec.
440. *Electromagnetic Fields and Guided Waves II*. 3 hr. PR: E.E. 340 or equiv. General theory of waveguides, cavity resonators, modes, losses, discontinuities, power considerations, scattering, perturbational and variational techniques. 3 hr. rec.
466. *Information Theory II*. 3 hr. Continuation of E.E. 366. 3 hr. rec.
471. *Switching Circuit Theory II*. 3 hr. PR: E.E. 370, Math. 236, or equiv. Switching circuit theory is used to model the operations of networks of logic gates and flip-flops. Networks of this type are one form of discrete parameter systems. Studies the use of the linear sequential machine as a means of modeling the general class of discrete parameter information systems. System approach and the techniques of abstract algebra used throughout. 3 hr. rec.
491. *Advanced Study*. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
496. *Graduate Seminar*. 1 hr. PR: Consent. Technical presentations by faculty members, outside speakers and graduate students. Each student will give an oral presentation describing the student's research before the student's final examination. This will typically be a 40-minute presentation before the faculty and graduate students.
497. *Research*. 1-15 hr.

INDUSTRIAL ENGINEERING

Master of Science in Industrial Engineering

Master of Science in Engineering

Students must comply with the rules and regulations as outlined in general requirements for graduate work in the College of Engineering. Each candidate will, with the approval of and at the discretion of the student's graduate committee, follow a planned program which must conform to one of the following outlines:

1. A minimum of 30 semester credit hours, not more than 6 of which are in research leading to an acceptable thesis.
2. A minimum of 30 semester credit hours, not more than 3 of which are in research leading to an acceptable problem report.
3. A minimum of 30 semester credit hours, with no thesis or problem report.

The M.S.I.E. program which requires a thesis is encouraged for students with an industrial engineering background.

The M.S.E. program which usually requires a problem report is designed for those students without an industrial engineering background who wish to pursue a broader more interdisciplinary program of graduate studies in operations research and industrial engineering.

Departmental Requirements. All students applying to the Department of Industrial Engineering for acceptance to the graduate program will be evaluated by the departmental Graduate Admissions Committee. If there is doubt about a student's ability to handle graduate level industrial engineering courses because of inadequate background training, then a number of hours of prerequi-

site industrial engineering courses will be stipulated in addition to the minimum requirements listed above. The student's committee may waive all or some of these prerequisites later based upon student course performance and/or special examination in the background areas.

Entrance Interview. All students beginning graduate study in industrial engineering will be given an entrance interview. The interview determines if a student is adequately prepared to pursue the master's degree program and aid the faculty in advising the student. As a result of the interview, the student and the committee should prepare a mutually acceptable preliminary plan of study.

Thesis Supervisor. Each student will be assigned to a thesis adviser who will normally serve as chairman of the Examining and Advisory Committee.

Courses. The adviser, in conjunction with an advisory and examining committee to be assigned to each student, will be responsible for following departmental guidelines to determine specific courses appropriate to the student's program. These departmental guidelines are available on request.

Thesis or Problem Report. A thesis or problem report is normally required of all candidates. While required credit in research (I.E. 497) is devoted to the thesis or report preparation, the thesis or problem report is not automatically approved after the required number of semester hours of research work have been completed. The thesis or problem report must conform with the general requirements of the Graduate School and with any additional requirements established by the Department of Industrial Engineering.

Final Examination. A candidate shall be required to pass an examination which may be written, oral, or both, to be administered by the student's advisory and examining committee. The examination shall cover course material and the thesis or problem report, depending upon the program followed.

Doctor of Philosophy

A candidate for the degree of Doctor of Philosophy must comply with the rules and regulations as outlined in general requirements for graduate work in the College of Engineering.

It is advisable that students who intend to work toward the Ph.D. degree with a major in industrial engineering hold an M.S.I.E., M.S.E. or equivalent degree. However, exceptions may be made in certain cases to allow direct enrollment in a Ph.D. program by a student holding only a B.S. degree.

Candidates for the Doctor of Philosophy degree, regardless of their area of research concentration, must attain an acceptable level of proficiency in each of the following areas: (1) applied statistics, (2) computer and numerical methods, (3) operations research, and (4) traditional I.E. methods and human factors. In addition, each candidate must include at least three mathematics courses in his program of study.

The doctoral dissertation research is expected to constitute a significant contribution to the art or science of engineering, with a high degree of creative and original effort. The dissertation must have good literary form and style. In addition, it must contain a thorough review of the work of others in the candidate's area of research, done to acceptable standards of documentation. Upon completion of the dissertation, the candidate will be required to defend the student's logic, critical ability, and reasoning power at an oral examination in the general field of study related to the research.

Industrial Engineering

I.E.

213. *Engineering Statistics*. 3 hr. PR or Conc.: Math. 17, I.E. 281 or consent. Sample spaces and probability. Normal, binomial, Poisson, and other distributions with engineering applications. Measures of central tendency and dispersion. Tests of significance and confidence intervals. Introduction to regression analysis. Engineering applications emphasized throughout.
214. *Analysis of Engineering Data*. 3 hr. PR: I.E. 213. Introduction to linear statistical models. Design and analysis of the simpler experimental configurations occurring frequently in engineering studies. Similarities and differences between regression and experiment design models are emphasized in a vector-matrix setting. Digital computer is used extensively.
215. *Statistical Decision Making*. 3 hr. PR or Conc.: I.E. 213. Basic concepts of probability theory. Discrete and continuous distributions, joint and derived distributions, with application to industrial and research problems.
222. *Job Evaluation and Wage Incentives*. 3 hr. PR: I.E. 140 or consent. Principles used in evaluating jobs, rates of pay, characteristics and objectives of wage incentive plans; incentive formulae and curves. 3 hr. rec.
243. *Plant Layout and Design*. 3 hr. PR: I.E. 142. Problems in industrial plant design. Equipment location, space utilization, layout for operation and control, flow sheets, materials handling. Allied topics in power utilization, light, heat, and ventilation. 1 hr. rec., 6 hr. lab.
249. *Design of Dynamic Materials Systems*. 3 hr. PR: I.E. 140, 142 or consent. Application of industrial engineering theory and practice to selection of material systems and equipment including efficient handling of materials from first movement of raw materials to final movement of finished product. Present quantitative design techniques. 3 hr. rec.
250. *Introduction to Operations Research*. 3 hr. PR: I.E. 213. Basic tools and philosophies of operations research. Tools include: linear programming, queueing theory, inventory theory, and simulation. Other operations research techniques presented as they relate to the overall systems philosophy.
251. *Analytical Techniques of Operations Research*. 3 hr. PR: I.E. 213. Survey of non-linear optimization techniques useful in operations research and industrial engineering studies. Includes classical optimization techniques, quadratic, geometric and dynamic programming, branch and bound and gradient techniques.
253. *Applied Linear Programming*. 3 hr. PR: I.E. 250 or consent. Application of the assignment, transportation, and simplex algorithms to typical industrial problems. The methods and computational efficiencies of the revised simplex and other algorithms are also studied.
259. *Introduction to Systems Engineering*. 3 hr. PR: I.E. 250, 277. Quantitative synthesis of OR models. Definition of terms. Development and testing of assumptions, objectives, and restrictions. Measurement of parameters in the model. Optimization techniques and error sensitivity of the optimal solution. Implementing, utilizing and updating the model.
260. *Human Factors Engineering*. 3 hr. PR: Consent. A survey of human factors engineering which includes the study of ambient environment, human capabilities and equipment design. Systems design for the man-machine environment interfaces will be studied with emphasis on health, safety, and productivity.

277. *Engineering Economy*. 3 hr. PR: Junior standing. Comparison of engineering alternatives using compound interest formulas and decision techniques based on annual costs, present worth, rate of return, benefit-cost ratio, depreciation, sunk costs, increment costs, retirement, replacement and taxes.
280. *Industrial Engineering Problems*. 1-3 hr. PR: Consent. Special problems relating to industrial engineering.
281. *Digital Computation for Engineers*. 3 hr. Conc.: Math. 16. Introduction to FORTRAN programming for engineering students. Emphasis will be on the development of skills in both problem definition and coding. Class projects will be chosen to illustrate selected numerical and non-numerical processing methods.
282. *Digital Computer Concepts*. 3 hr. PR: I.E. 181 or 281 or consent. Principles of digital computer functional components. Study of digital operating systems including structure of the various subsystem components such as monitors, input control systems and loaders.
283. *Information Retrieval*. 3 hr. PR: I.E. 181 or 281 or consent. Study of tools, elements, and theories of information storage and retrieval. Areas of study include documentation, information framework; indexing; elements of usage, organization and equipment; parameters and implementation; theories of file organization and system design. 3 hr. rec.
284. *Simulation by Digital Methods*. 3 hr. PR: I.E. 213 or consent. An introduction to digital (Monte Carlo) simulation methods and their application to operations research problems. Student will develop computer programs to simulate and analyze practical situations. Interpretation of results emphasized.
300. *Special Topics in Manufacturing Processes and Automation*. 3 hr. PR: I.E. 100 or equiv. Special topics concerning manufacturing processes and automation with special emphasis on manufacturing management.
313. *Statistical Methods in Engineering*. PR: Math. 1b. Introduction to statistical methods in engineering including probability and random variables, empirical and theoretical distributions, hypothesis tests, and elementary regression analysis.
314. *Design of Industrial Experiments*. 3 hr. PR: I.E. 214 or consent. Continuation of I.E. 214. Study of more complex experimental design especially useful to engineering and industrial researchers, including factorials and optimum-seeking design. Emphasis on use of existing digital computer routines and interpretation of results.
325. *Management Control*. 3 hr. PR: I.E. 170 or consent. Effective techniques for higher management control, including current concepts and controls applicable to production management problems.
340. *Fundamentals of Traditional Industrial Engineering*. 3 hr. Basic fundamentals of traditional industrial engineering including methods studies and improvement methods and activity analysis charts, work measurement, suggestion systems, plant layout, and materials handling principles.
341. *Methods Analysis and Work Simplification*. 3 hr. PR: I.E. 140, 277. Advanced study of the techniques of methods analysis, including modern means of methods research. Development of appropriate cost analyses to accompany improved operating plans. A study of the design, installation, and administration of work simplification programs, suggestion systems, and remuneration policies, and the means of intra-plant communications concerning such programs. 2 hr. rec., 3 hr. lab.
342. *Advanced Production Control*. 3 hr. PR: I.E. 250. Different mathematical models useful in the design of effective production control systems. The various models to be covered include: static production control models under risk and under uncertainty, dynamic models under certainty, under uncertainty, and under risk.
350. *Survey of Operations Research*. PR: I.E. 213 or consent. A survey of operations research methods for graduate students with no previous background in operations

research. Topics to be covered include linear programming, project management, queueing theory, inventory theory, and simulation.

355. *Scheduling and Sequencing Methods*. PR: I.E. 250. Theory and applications of analytical models used in the scheduling of operations. Topics include single machine scheduling models, flow shop models, job shop models, and assembly line balancing methods.
357. *Management Applications of Operations Research*. 3 hr. PR: Consent. Examination of the contributions which operations research may make in business administration. Topics include linear programming, simulation, project management, data analysis, and data processing.
358. *Special Topics in Systems Analysis and Operations Research*. 3-6 hr. PR: Consent. Special topics from recent developments in operations research and related fields. Special emphasis will be placed on interests of current graduate students.
359. *Operations Research for Public Administrators*. 3 hr. PR: Consent. Examination of role of quantitative analysis in public administration and decision-making.
360. *Human Factors System Design*. 3 hr. PR: I.E. 260. Theoretical aspects and practical applications of man/machine relationships as they influence future system design. The student will examine human limitations with respect to acceptance of information, decision making, and ability to transmit the result of such decisions to controlled equipment systems to obtain design optimization. 2 hr. rec., 3 hr. lab.
368. *Advanced Problems in Human Factors*. 1-3 hr. PR: I.E. 260 or 360 and graduate standing. Special problems relating to one of the areas of human factors, such as simulation, controls, vigilance, and maintainability.
377. *Advanced Engineering Economy*. 3 hr. PR: I.E. 277 or consent. Special emphasis on depreciation, engineering and economic aspects of selection and replacement of equipment; relationship of technical economy to income taxation and load factor and capability to economy. 3 hr. rec.
381. *Integrated Data Processing*. 3 hr. PR: I.E. 281 and consent. Advanced work in electronic data-processing systems and procedures design. Case studies of integrated data-processing systems. Course projects will include individual use of a computer in management data-processing analysis problems. 3 hr. rec.
385. *Digital Computer Applications*. 1 hr. PR: Graduate standing in engineering, physical science or mathematics. Special study of a selected programming language.
389. *Special Topics in Industrial Data Processing Systems*. PR: I.E. 281 or consent. Selected topics relating to industrial applications of computer and data processing systems including inventory, scheduling, accounting, personnel and management information systems with special emphasis on the cost-effectiveness of various systems.
431. *Traffic Flow Theory*. 3 hr. PR: I.E. 213 and C.E. 439 or consent. Hydrodynamic, car-following, and queueing theory models of traffic flow. Emphasis on the application of probability theory models to traffic situations.
451. *Nonlinear Programming*. PR: I.E. 250 or consent. Advanced study of the techniques of nonlinear programming and their applications. Topics covered include steepest descent, Newton's method, Fletcher-Powell, conjugate gradients, Powell's method, and penalty function methods.
452. *Queueing Theory*. 3 hr. PR: I.E. 213 and 215. Best operating conditions for systems involving waiting times. Elements of stochastic processes. Single-channel and multi-channel models. Computational methods, including Monte Carlo techniques. Applications to problems such as maintenance and inventory control. 3 hr. rec.

453. *Theory of Linear Programming*. 3 hr. PR: I.E. 250 or consent. Study of procedures available for solving large-scale optimization problems using linear programming. Topics include decomposition techniques, multiple pricing, cycling, inverse generation and storage, ranging procedures, and upper bound algorithms.
454. *Inventory Theory*. 3 hr. PR: I.E. 215. Techniques used in optimization of inventory systems. Elements of static, deterministic inventory models, and static, stochastic inventory models. Dynamic inventory models. Selected topics related to inventory analysis. 3 hr. rec.
455. *Probability Theory for Engineers*. 3 hr. PR: I.E. 215 or consent. Probability theory and its application to industrial systems with particular emphasis on inventory, queueing, maintenance, reliability, and quality control systems.
456. *Applied Stochastic Processes*. 3 hr. PR: I.E. 215, 455. Stochastic systems with emphasis on application to inventory and queueing theory. Conditional probability, Poisson processes, counting processes, renewal processes, Markov chains with discrete and continuous parameters.
457. *Dynamic Programming*. PR: I.E. 250 or consent. Introduction to basic structure and computational aspects of dynamic programming and applications including sequential decision problems, deterministic and probabilistic models over finite and infinite planning horizons and Markovian decision processes.
458. *Integer Programming and Applied Networks*. PR: I.E. 250 or consent. Introduction to application of integer programming and maximum flow networks to engineering and operations research problems. Emphasis on problem formulation and solution.
480. *Seminar*. 1-6 hr. PR: Consent. Discussion of research in industrial engineering and special problems.
484. *Advanced Digital Simulation*. PR: I.E. 284 or consent. Analysis and comparison of special purpose digital simulation languages such as GPSS, SIMSCRIPT, GASP, CSMP, DYANAMO, and JOB SHOP simulation.
497. *Research*. 1-15 hr.

MECHANICAL ENGINEERING AND MECHANICS

The Department of Mechanical Engineering and Mechanics has programs leading to the degrees of Master of Science in Mechanical Engineering (M.S.M.E.), Master of Science in Theoretical and Applied Mechanics (M.S.T.A.M.), and Master of Science in Engineering (M.S.E.). At present there are four major areas of study within the department which enable students to pursue broad or concentrated educational programs. These areas are: (1) solid mechanics and materials, (2) dynamics and controls, (3) fluid mechanics, and (4) thermal energy. A student's program may emphasize either the design or research aspects of engineering.

Educational objectives of the department's Master's degree programs are:

1. To provide advanced, and often terminal, training for students in or entering the engineering profession, and/or
2. To provide the basic graduate educational experience for students wishing to pursue a Ph.D.

Master of Science in Mechanical Engineering

Students wishing to pursue a program leading to an M.S.M.E. should have a B.S.M.E. from an accredited ECPD curriculum, or its equivalent. Students with other than a mechanical engineering background normally will be requested to strengthen their mechanical engineering background.

Minimal Requirements. Thirty semester hours of approved graduate level courses which must include at least 6 hours of mathematics, 3 hours of engineering methods, and 12 total hours of courses from at least two areas of study in the Department of Mechanical Engineering and Mechanics.

Master of Science in Theoretical and Applied Mechanics

Students wishing to pursue a program leading to an M.S.T.A.M. should have a baccalaureate in engineering from an accredited ECPD curriculum or its equivalent. Students with other than engineering backgrounds (mathematics, physics, physiology, etc.) may be required to strengthen their engineering backgrounds before beginning their graduate programs.

Minimal Requirements. Thirty semester hours of approved graduate level courses, to include at least 6 hours of mathematics, 3 hours of engineering methods, and 9 hours of courses in the Department of Mechanical Engineering and Mechanics.

Master of Science in Engineering

This program generally is intended for students who desire to do graduate work in areas other than their baccalaureate major. Students desiring to pursue such a program in the Department of Mechanical Engineering and Mechanics must meet the same minimal requirements as for the M.S.T.A.M., although their overall program may be more flexible.

Thesis. A thesis may be required in any of the above degree programs. No more than 6 hours of research credit may be given for an acceptable thesis.

Final Examination. Ordinarily a final examination is required for all candidates for masters degrees.

Doctor of Philosophy

Students intending to pursue a Ph.D. program in the Department of Mechanical Engineering and Mechanics should have earned a B.S. or M.S. degree in some discipline of engineering. While it is possible for a student with a B.S. degree to enroll directly in the Ph.D. program, it is usually advisable to earn a Master's degree first.

As with the department's masters programs, the courses of study are selected to fit the individual interests and objectives of the student, with proper attention given to the rounding out of related areas of study and meeting the College's interdisciplinary curriculum requirements. Generally, a typical Ph.D. program will conform to the following outline.

First Year — Master's Degree

Second Year —

- (a) An approved program of study consisting of approximately 30 credit hours of 300 and 400 series courses (some approved 200 series courses are acceptable)
- (b) Admission to Candidacy
 - i. Qualifying examinations covering the student's major and minor areas of study
 - ii. Defense of research proposal
 - iii. Completion of all program requirements.

Third Year —

- (a) Dissertation
- (b) Final Examination

The research work for the doctoral dissertation is expected to represent a significant contribution to the art or science of engineering. It may entail a fundamental investigation into a specialized area, or a broad and comprehensive study of a novel system design. In either case, a high degree of creative and original effort is required to meet the standards of acceptability.

The student must pass a final examination in defense of the dissertation that is administered by the student's research committee.

Mechanical Engineering and Mechanics

M.E.M.

- 200. *Advanced Mechanics of Materials I*. 3 hr. PR: M.E.M. 52 or consent. Theories of failure and design procedures; time and temperature dependent behavior; shear center, unsymmetrical bending, curved beams. 3 hr. rec.
- 204. *Dynamics of Physical Systems*. 3 hr. PR: M.E.M. 52 and Math. 18 or consent. Physical systems such as hydraulic, mechanical, electrical, electromechanical, electrohydraulic, hydromechanical, and thermodynamic considered. Emphasis on the modeling of compound systems and studying their natural behavior using analytical techniques. Use of computers in analysis of physical systems.
- 210. *Kinematics*. 3 hr. PR: M.E.M. 112 and Math. 18 or consent. Geometry of constrained motion, kinematics synthesis and design, special linkage. Coupler curves, inflection circle, Euler-Savary equation, cubic of stationary curvature and finite displacement techniques. 3 hr. rec.
- 222. *Mechanical Vibrations*. 3 hr. PR: Math. 18, M.E.M. 112, or consent. Fundamentals of vibration theory. Free and forced vibration of single and multiple degree of freedom systems. Solution by Fourier and Laplace transformation techniques. Transient analysis emphasized. Energy methods. 3 hr. rec.
- 232. *Introduction to Feedback Control*. 3 hr. PR: Math. 18, E.E. 105 or M.E.M. 204 or consent. Fundamentals of automatic control theory. Transfer functions and block diagrams for linear physical systems. Proportional, integral, and derivative controllers. Transient and frequency response analysis using Laplace transformation.
- 236. *Systems Analysis of Space Satellites*. 3 hr. PR: Senior standing. Introduction to engineering principles associated with analysis and design of space satellites. Emphasis on the interdisciplinary nature of satellite systems analysis. 3 hr. rec.
- 238. *Introduction to Underwater Engineering*. 3 hr. PR: Consent. Underwater portion of our world with emphasis on science and technology. Emphasis on economic and social needs for maritime resources, maritime law, and public policy, as well as general and basic engineering aspects of the underwater communication, navigation, and structures.
- 240. *Problems in Thermodynamics*. 3 hr. PR: M.E.M. 141 or consent. Thermodynamic systems with special emphasis on actual processes. Problems presented are designed to strengthen the background of the student in the application of the fundamental thermodynamic concepts. 3 hr. rec.
- 242. *Bioengineering*. 3 hr. Introduction to human anatomy and physiology using an engineering systems approach. Gives engineering student basic understanding of the human system so that the student may include it as an integral part of the design.

244. *Introduction to Gas Dynamics*. 3 hr. PR: M.E.M. 144 or consent. Basic fundamentals of gas dynamics, one-dimensional gas dynamics and wave motion, methods of measurement, effect of viscosity and conductivity, and concepts from gas kinetics. 3 hr. rec.
250. *Heat Transfer*. 3 hr. PR: M.E.M. 140 or 101. Steady state and transient conduction. Thermal radiation. Boundary layer equations and forced and free convection are also covered. 3 hr. rec.
254. *Applications in Heat Transfer*. 3 hr. PR: M.E.M. 250. For students desiring to apply basic heat transfer theory and digital computation techniques to problems involving heat exchangers, power plants, electronic cooling, manufacturing processes, and environmental problems.
262. *Internal Combustion Engines*. 3 hr. PR: M.E.M. 101 or 141. Thermodynamics of internal combustion engine; Otto cycle; Diesel cycle, gas turbine cycle, two- and four-cycle engines, fuels, carburetion and fuel injection; combustion; engine performance, supercharging. 3 hr. rec.
264. *Heating, Ventilating, and Air Conditioning*. 3 hr. PR: M.E.M. 141 or consent. Methods and system of heating, ventilating, and air conditioning of various types of buildings, types of controls and their application. 3 hr. rec.
282. *Engineering Acoustics*. 3 hr. PR: Math. 18 or consent. Basic theory of sound propagation and transmission. Identification of important industrial noise sources and sound measurement equipment. Selection of appropriate noise criteria and control methods. Assessment of noise abatement technology. Laboratory studies and case histories.
290. *Seminar*. 1-6 hr. PR: Junior, senior, or graduate status, and consent.
294. *Special Topics*. 1-6 hr. PR: Junior, senior, or graduate status, and consent.
299. *Special Problems*. 1-6 hr. PR: For junior, senior, and graduate students.
301. *Advanced Engineering Acoustics*. 3 hr. PR: M.E.M. 282 or consent. Study of complex sound generation and the propagation, transmission, reflection, and absorption of air-borne and structure-borne sound. Coupling of sound and vibration in structures. Acoustical behavior and characteristics of materials.
305. *Analytical Methods in Engineering I*. 3 hr. PR: Consent. Index notation for determinants, matrices, and quadratic forms; linear vector spaces, linear operators including differential operators; calculus of variations, eigenvalue problems, and boundary value problems.
306. *Analytical Methods in Engineering II*. 3 hr. PR: M.E.M. 305 or at least two semesters of advanced calculus. Intended for advanced graduate students interested in modern analysis for engineering applications.
307. *Non-Linear Analysis in Engineering*. 3 hr. PR: Consent. Special topics in non-linear analysis of various types of engineering systems. Various numerical, approximate, and analytical techniques chosen to suit the needs and interests of advanced graduate students.
310. *Advanced Mechanics of Materials II*. 3 hr. PR: Consent. Beams on elastic support, cylindrical shells with bending, torsion of noncircular members, two-dimensional applications in elasticity, contact stresses, and simple problems in plates and shells. 3 hr. rec.
312. *Inelastic Behavior of Engineering Materials*. 3 hr. PR: M.E.M. 51, 52 and consent. Characterization and modeling of typical engineering materials, elastic, visco-elastic, and plastic materials, design considerations.
316. *Energy Methods in Applied Mechanics*. 3 hr. PR: Consent. Variational principle of mechanics and applications to engineering problems; principles of virtual displacements, minimum potential energy, and complementary energy. Castigliano's theo-

rem, Hamilton's principle. Applications to theory of plates, shells, and stability. 3 hr. rec.

318. *Continuum Mechanics*. 3 hr. PR: M.E.M. 51, 52. Emphasizes the basic laws of physical behavior of continuous media. Analysis of stress; equations of motion and boundary conditions; kinematic analysis; rates of strain, dilatation and rotation; bulk time, rates of change; constitutive equations with special attention to elastic bodies and ideal fluids; energy equations and the first law of thermodynamics. 3 hr. rec.
320. *Theory of Elasticity I*. 3 hr. Cartesian tensors; equations of classical elasticity, energy, minimum, and uniqueness theorems for the first and second boundary value problems; St. Venant principle; extension, torsion, and bending problems. 3 hr. rec.
322. *Advanced Vibrations I*. 3 hr. PR: M.E.M. 222 or consent. Dynamic analysis of multiple degree of freedom discrete vibrating systems. Lagrangian formulation, matrix and numerical methods, impact and mechanical transients.
325. *Experimental Stress Analysis*. 3 hr. PR: M.E.M. 51, 52. Classical photoelasticity, brittle lacquers, birefringent coatings, strain gage techniques and instrumentation, as applied to problems involving static stress distributions. 2 hr. rec., 3 hr. lab.
330. *Instrumentation in Engineering I*. 3 hr. PR: Consent. Theory of measuring systems, emphasizing measurement of rapidly changing force, pressure, strain, temperature, vibration, etc. Available instruments, methods of noise elimination, types of recording studied. Special value to students in experimental research. 2 hr. rec., 3 hr. lab.
333. *Advanced Machine Design*. 3 hr. PR: M.E.M. 134 or consent. Design for extreme environments, material selection, lubrication and wear, dynamic loads on cams, gears, and bearings, balancing of multiengines and rotors, electromechanical components.
340. *Advanced Thermodynamics I*. 3 hr. PR: M.E.M. 141. First and second laws of thermodynamics with emphasis on the concept of entropy production. Application to a variety of nonsteady open systems, thermodynamics of multiphase, multicomponent and reacting systems. Criteria for equilibrium and stability.
342. *Advanced Thermodynamics II*. 3 hr. PR: M.E.M. 340 or consent. Continuation of topics related to reactive systems. Adiabatic flame temperatures, reaction kinetics, conservation of species equations, flame propagation and detonation.
344. *Statistical Thermodynamics*. 3 hr. PR: M.E.M. 340 or equiv. Microscopic thermodynamics for Boltzmann, Bose-Einstein, and Fermi-Dirac statistics. Schrodinger wave equation, partition functions for gases and solids.
348. *Heat Transfer*. 3 hr. PR: Undergraduate course in heat transfer or consent. Graduate course in heat transfer primarily for mechanical engineering students. Topics include one-, two-, and three-dimensional thermal conduction involved in mechanical processes both for constant and time varying temperature fields, free and forced convection in heat exchangers, heat power equipment and aircraft and radiative heat transfer between surfaces and absorbing media as found in furnaces, industrial processes, and aerospace applications.
350. *Conduction Heat Transfer*. 3 hr. PR: M.E.M. 250 or consent. Analytical, numerical, graphical, and analog solutions of steady and non-steady heat conduction problems in isotropic and anisotropic solids. Thermal properties, extended surfaces, thermal stress, interphase conduction with moving interface, localized and distributed sources.
352. *Intermediate Dynamics*. 3 hr. PR: M.E.M. 52. Newtonian and Lagrangian mechanics. Dynamics of discrete systems and rigid bodies analyzed utilizing Newtonian and Lagrangian formulations.
353. *Advanced Dynamics I*. 3 hr. PR: M.E.M. 352 or consent. Analytical mechanics. Stability of autonomous and nonautonomous systems considered and analytical

solutions by perturbation techniques introduced. Hamilton-Jacobi equations developed. Problems involving spacecraft, gyroscopes and celestial mechanics studied.

354. *Convection Heat Transfer*. 3 hr. PR: M.E.M. 250 or consent. Laminar and turbulent flows. Analytical, numerical, and analogical solution. Selected topics study of current research publications.
355. *Radiation Heat Transfer*. 3 hr. PR: M.E.M. 250 or consent. Classical derivation of black body radiation laws; grey body and non-grey analysis; radiant properties of materials, radiant transport analysis, specular-diffuse networks, gas radiation, thermal radiation measurements: analytical, numerical solutions, and study of selected current publications.
360. *Fluid Mechanics I*. 3 hr. PR: M.E.M. 144 or equiv. Advanced dynamics and thermodynamics of fluids. Basic laws of conservation of mass and momentum in differential, vector, and integral forms. Application to internal flows, fluid machinery, and structures.
364. *Turbomachinery*. 3 hr. PR: M.E.M. 101 or 141. Flow problems encountered in design of water, gas, and steam turbines, centrifugal and axial flow pumps and compressors, design parameters.
384. *Feedback Control in Mechanical Engineering*. 3 hr. PR: M.E.M. 232 or consent. Control analysis of hydraulic and pneumatic closed-loop systems including spool valves, flapper valves, pumps, servomotors, and electrohydraulic servomechanisms. Investigation of nonlinearities by phase plane, Liapunov, and describing function techniques. Programming for analog and digital computer simulation. Introduction to fluidic elements and logic circuits.
394. *Special Topics*. 1-6 hr. For senior and graduate students.
399. *Special Problems*. 1-6 hr. For senior and graduate students.
414. *Theory of Elastic Stability*. 3 hr. PR: Consent. Stability of discrete mechanical systems, energy theorems, buckling of beams, beam columns, and frames, torsional buckling, buckling of plates and shells, special topics.
419. *Topics in Fluids and Solids*. 3 hr. PR: Consent. Finite elasticity and viscoelasticity, non-Newtonian fluids, non-linear constitutive theories, special topics in solids and fluids.
421. *Theory of Elasticity II*. 3 hr. PR: M.E.M. 320 (or M.E.M. 310 and consent). Complex variable methods, potential methods, elastic-viscoelastic correspondence principle, boundary value problems, various special topics. 3 hr. rec.
422. *Advanced Vibrations II*. 3 hr. PR: M.E.M. 222, M.E.M. 322 or consent. Dynamic analysis of continuous media. Vibration and wave motion analysis of strings, elastic bars, beams, plates and fluid columns. Earthquake wave propagation.
424. *Theory of Plates and Shells*. 3 hr. PR: M.E.M. 310. Theory of rectangular and circular plates, membrane shells of revolution, shells with bending stiffness, dynamic response of plates and shells.
428. *Photomechanics*. 3 hr. PR: M.E.M. 200, 325. Theory of optics, birefringence, stress-optic law, polariscope, compensation. Techniques of model making, photography, polariscope use. Photoelastic coating methods and use of various reflective polariscopes. Data interpretation by various methods including principal stress separation by shear difference, oblique incidence and graphical integration. 2 hr. rec., 3 hr. lab.
431. *Instrumentation in Engineering II*. 3 hr. PR: M.E.M. 330. Continuation of M.E.M. 330 with emphasis on transducers for static and dynamic measurement, and their use in practical measuring systems. 3 hr. rec.
440. *Irreversible Thermodynamics I*. 3 hr. PR: M.E.M. 340 or consent. Phenomenological treatment of the laws of dynamics and thermodynamics for irreversible processes in continuous media. Linear laws for combined irreversible phenomena including

viscous dissipation, heat conduction, diffusion, chemical reactions and electric and magnetic effects, are developed taking into account Curie's principle and the Onsager relations. The principle of the minimum rate of creation of entropy is extended to establish criteria for the stability of stationary states. Tensor and variational methods are employed.

- 441. *Irreversible Thermodynamics II*. 3 hr. PR: M.E.M. 440. Continuation of M.E.M. 440 with emphasis on selected topics from such applications as thermoelectricity, anisotropic heat conduction, stability of fluid motion, thermal diffusion and separation, visco-chemical drag, electro chemical cells, and other coupled phenomena of physical or biological interests.
- 454. *Advanced Dynamics II*. 3 hr. PR: Consent. Advanced study in dynamics. Topics covered are either non-linear vibration, advanced control theory or stability theory depending on student demand.
- 461. *Fluid Mechanics II*. 3 hr. PR: M.E.M. 360 or equiv. Statistical nature of turbulence, correlation functions and fourier representations. Kinematics of isotropic and non-isotropic turbulent flows. Experimental methods. Application to dynamic loading on structures, diffusion and dispersion of contaminants by turbulent fields and heat and mass transfer.
- 491. *Advanced Study*. 1-6 hr. PR: Consent. Advanced study in areas not covered by formal courses.
- 492. *Seminar: Engineering Education*. 1-6 hr. PR: Consent. Studies and group discussion of selected problems in engineering education. Emphasis on application of educational principles to specific areas in engineering education.
- 493. *Seminar: Bioengineering*. 1-6 hr. PR: Consent. An exposition of contemporary topics in bioengineering. Topics include advancements in biomedical instrumentation, prosthetics, cardiovascular research, biological controls, biomechanics, neurophysiological research, human factors and anthropometrics.
- 494. *Seminar*. 1-6 hr. PR: Consent. Discussion, library readings, and individual study reports in the mechanical engineering field.
- 497. *Research*. 1-15 hr. PR: Graduate standing.
- 499. *Graduate Colloquium*. 1-6 hr. PR: Consent. For graduate students not seeking course work credit but who wish to meet residence requirements, use university facilities and participate in its academic and cultural programs.

College of Human Resources and Education

The College of Human Resources and Education includes the areas of clinical studies, education, and family resources. The College brings together several disciplines and professions devoted to the study and maximum development of human talent and resources, whether in the context of the school, the family, or the community. Programs of instruction, research, and extended service are carried out in close cooperation with other related departments and divisions of the University.

Admission and Curriculum

All students apply for admission to the Graduate School through the Office of Admissions and Records. All candidates for graduate degrees must conform to the general regulations of the Graduate School. Certain details in regard to admission to specific graduate programs of the College are provided on the following pages. Additional information may be obtained by writing the department chairperson in which the graduate program is offered, or by writing the Dean of the College of Human Resources and Education.

The curriculum and degree requirements of the various master's degree programs of the College are given in each of the respective departments. It is the responsibility of the student to take steps to insure being properly informed of the requirements of the degree toward which the student aspires and/or the certification standards to which the student may wish to conform. Members of the faculty and the student's adviser will offer counsel on these matters upon request.

Doctor of Education

The Ed.D. is a competency based program. The student's adviser and committee determines the competencies the student must attain and how they are to be evaluated. The degree requires that the candidate demonstrate an ability to conduct research. Faculty expertise and College resources are available for students desiring to elect research projects in any of the following areas: counseling and guidance and rehabilitation counseling, curriculum development (elementary or secondary areas), education administration, engineering education, health education, music education, physical education, reading, safety studies, special education, and technology education. It may be possible for committees to be formed which can guide doctoral research in other areas as well. However, the applicant should write the Dean of the College of Human Resources and Education to verify this before enrolling at WVU.

Admission. Individuals who wish to pursue a program leading to the Doctor of Education degree must be admitted to the Graduate School. All applicants for admission to the doctoral program in the College of Human Resources and Education must submit scores on the aptitude test of the Graduate Record Examination and comply with the general regulations of the Graduate School. Acceptance for study toward the doctoral degree in a specified area of concentration will be made by the faculty of the specific program and department.

Doctoral Committee. Having received an affirmative recommendation for admission to a specific program, the student recommends a chairperson and

four committee members as the student's doctoral committee for approval by the faculty members involved, the chairperson of the department, and the Dean of the College. At least one member of the doctoral committee must come from a supporting discipline outside the College of Human Resources and Education and no more than three from any single program area of the College.

Curriculum. The final determination of the program of coursework and research is the responsibility of the student's doctoral committee. The Doctor of Education degree is not awarded on the basis of the completion of any set number of credits but is awarded on the basis of demonstrated academic achievement and scholarly competence. The minimum course work shall be 70 credits of relevant graduate work, excluding dissertation credit but including credits of relevant graduate work completed at the master's degree level. A minimum of 24 of the 70 semester hours shall be in the area of major concentration in a supporting or related discipline.

Admission to Candidacy Examination. The purposes of the admission to candidacy examination are to assess the quality of the student's academic achievement, to review the student's program of coursework, to approve a proposed outline of dissertation research, and to admit the student to formal candidacy for the degree.

The student and the committee at the time of program planning will include competencies to be developed and how they will be assessed. These will be written into the student's program. The doctoral student and the permanent committee will determine when the student is ready for assessment of competencies.

The examination will be prepared and assessed by the student's doctoral committee. The chairperson will notify the student and the student records office, who will notify all appropriate offices of the outcome. Upon successful completion of the admission to candidacy examination, the student will be admitted to formal candidacy for the doctoral degree.

Dissertation. The candidate must submit and justify a prospectus for a doctoral dissertation as a portion of the admission to candidacy examination. The doctoral committee must review and *approve*, *approve with change*, or *reject* the outline or prospectus. The student shall consult with all members of the doctoral committee and with other appropriate members of the University faculty during the dissertation phase of the program.

Final Oral Examination. The student will be admitted to final oral examination upon completion of the dissertation and after fulfilling all other requirements set by the committee. The examination will be conducted by the student's doctoral committee and will be open to all members of the University faculty. The candidate will not be recommended for the doctoral degree if the student receives more than one unfavorable vote from the doctoral committee.

Time Limitation. All requirements must be completed within seven years.

Residency. The minimum is two semesters of residence in full-time graduate study at WVU.

Doctor of Philosophy in Psychology (Ph.D.)

A Ph.D. program in educational psychology is offered jointly by the Department of Educational Psychology and Department of Psychology. Admission to the program is open only to those students who intend to pursue their graduate studies as full-time students. Students admitted to the program must satisfy the minimal requirements of the Department of Psychology, the Division of Education, and the Graduate School. Those students having no previous graduate

training as well as students with a master's degree, will be eligible for admission provided they can meet the admission requirements as established by the interdepartmental committee.

The program is designed to allow students to pursue an area of concentration in learning and development with cognate areas in research, measurement, statistics, instructional design, or curriculum development.

Requests for admission application, as well as for specific guidelines for entrance to the educational psychology program, will be provided by the Department of Educational Psychology or the Department of Psychology.

Further information may be obtained at the Department of Psychology.

Certificate of Advanced Study in Education

This program is designed to prepare school and related personnel who wish professional training beyond the master's degree. Candidates for the Certificate of Advanced Study in Education may choose from among the following areas of study for their area(s) of concentration: (a) Administration and Supervision; (b) Curriculum and Instruction; (c) Counseling and Guidance, Reading, and Special Education; (d) Physical Education, and (e) Safety Studies. Persons interested in the certificate should consult with the director of the appropriate division or Dean of the College of Human Resources and Education.

Admission. Individuals who wish to pursue a program leading to the certificate must be admitted to the Graduate School. All applicants for admission to the program in the College of Human Resources and Education must submit scores on the aptitude test of the Graduate Record Examination and comply with the general regulations of the Graduate School. Acceptance for study toward the certificate in a specific area of concentration will be made by the faculty of the specific program and department.

Requirements for Admission to Candidacy. 1. Evidence through examination, personal letter, and personal interview of general proficiency, acceptable standards of oral and written communication. 2. Satisfactory completion *in residence* at WVU of at least 6 semester hours of approved coursework beyond conferring of the master's degree.

Program. An approved program consisting of a minimum of 30 semester hours earned above the master's degree including 24 hours of coursework in the College of Human Resources and Education, or in closely related fields, and 6 hours of research.

At least 24 semester hours of the work credited for this certificate must be done in residence at WVU. This includes the 6 hours of research which may be conducted apart from the physical limits of the University but must be done under the direction and supervision of the chairperson of the student's graduate committee. A maximum of 6 semester hours earned in residence at another approved graduate institution or in WVU off-campus education, may, if approved by the student's adviser, be allowed toward credit for the certificate. The minimum period of full-time graduate study in residence at WVU is one semester or one full summer session.

Final Examination(s). Upon completion of all requirements, including the research report, the candidate will be admitted to a final oral examination by the student's graduate committee.

Time Limitation. All requirements must be completed within seven years immediately preceding the awarding of the certificate.

Clinical Studies

Clinical Studies includes the programs leading to masters degrees in Counseling and Guidance, Rehabilitation Counseling, Special Education, and Speech Pathology and Audiology. The degree of Doctor of Education is offered in the areas of Counseling and Guidance and Special Education.

Candidates for graduate degrees must meet the general regulations of the Graduate School, the College of Human Resources and Education, and specific regulations as required by the departmental programs.

A person who wishes to pursue a graduate degree in the program area of Clinical Studies must meet the general requirements for admission to the Graduate School and the College of Human Resources and Education. Additionally, to be admitted to candidacy for the master's certificate of advanced study, or doctoral degrees, prospective candidates must meet the appropriate requirements and procedures described herein.

COUNSELING AND GUIDANCE (M.A.) AND REHABILITATION COUNSELING (M.S.)

The Departments of Counseling and Guidance and Rehabilitation Counseling offer a combined curriculum at the master's degree level. All students enroll for a general counseling core during their first semester and then take a specialty curriculum for the balance of their graduate studies. A number of courses are designed on a competency basis.

General Requirements for Admission

The following steps are necessary for admission:

1. Application to WVU Office of Admissions and Records.
2. Special application to the Departments of Counseling and Guidance and Rehabilitation Counseling.
3. Minimum undergraduate grade-point average in accord with Graduate School standards for admission as a Regular Graduate Student.
4. Bachelor's degree and coursework in appropriate areas.
5. Satisfactory references.
6. A personal interview with faculty members and student representatives.
7. Approval of application by the departmental Admissions Committee.

Students are encouraged to pursue as much of their program as possible on a full-time basis. Applications from part-time students will be accepted provided such applicants are engaged in counseling functions in their schools or agencies.

Core Requirements for Counseling and Guidance and Rehabilitation Counseling

All students will be expected to take the following core courses:

- C&G 301 — Fundamentals of Counseling
- C&G 302 — Human Relationships
- C&G 303 — Basic Course in Guidance
- C&G 305 — Theory and Practice of Human Appraisal
- C&G 306 — Counseling Theory and Techniques

Speciality Areas

The following speciality areas are available through the combined Departments of Counseling and Guidance and Rehabilitation Counseling:

Rehabilitation Counseling — Rehabilitation Counseling is a professional counseling speciality that provides vocational and personal counseling to physically handicapped clients, persons with learning difficulties, and those who are seeking readjustment from psychiatric problems. Counselors work for both public and private rehabilitation agencies, centers, and workshops.

The degree requirements include completion of the core courses, required Rehabilitation Counseling courses, and a 10-12 hour supervised clinical practice placement (internship) under faculty direction in a rehabilitation setting. The program requires a minimum of 42 semester hours with a 3.0 grade-point average. In most cases, the total program will range between 42-48 semester hours. In addition to completing all coursework and the internship satisfactorily, a candidate must demonstrate the ability to assume the responsibility required of a professional counselor and the personal characteristics essential to effective working relationships with others.

The choice of courses comprising the speciality area will be determined by an evaluation of the needs of the individual student.

After completion of the core courses, the following courses — in addition to electives — will be required:

Rehab. Counsel. 300 — Introduction to Rehabilitation Services

Rehab. Counsel. 310 — Medical Aspects of Rehabilitation

Rehab. Counsel. 312 — Psychological Aspects of Disability

Rehab. Counsel. 320 — Vocational Development and Occupational Choices

Rehab. Counsel. 491 — Directed Study and Research

Rehab. Counsel. 462 — Clinical Conference in Rehabilitation

Rehab. Counsel. 472 — Counseling Practicum

Rehab. Counsel. 475 — Clinical Practice

Students may take the professional certification examination to obtain national certification as a rehabilitation counselor.

School Counseling — School counseling provides a broad opportunity to work with children at the elementary-school level, adolescents at the secondary-school level, and young adults at the college level. The school counselor is involved in personal counseling, career guidance, vocational and educational counseling, family counseling, and consultation on classroom problems with teachers and administrators. Counselors must be equipped to work with both individuals and groups. Much of the school counselor's work is carried out in classrooms with teachers and students. The school counselor also is active in working with community agencies. At the college level, the counselor may work extensively with the special educational services available for the benefit of the college student. Degree requirements include completion of the core curriculum, required Counseling and Guidance coursework, and 4 semester hours of practicum under faculty direction. The program requires a minimum of 36 hours with a 3.0 grade-point average. In addition to completing all coursework and the practicum satisfactorily, the candidate must demonstrate the ability to assume the responsibility required of a professional counselor.

In addition to the core coursework, students will take:

C&G 309 — Group Counseling Theory and Techniques

C&G 320 — Vocational Development and Occupational Choices

- C&G 308 — Organization and Development of Counseling and Guidance Services
C&G 331 — Consultation Techniques
C&G 385 — Practicum

**Professional Counselor Endorsement for School Counselors in West Virginia
(Certification)**

1. A minimum grade-point average of 3.0.
2. Recommendation of the faculty.
3. A valid professional teaching certificate at the level for which counseling and guidance endorsement is desired.
4. Two years of successful educational experience in teaching or counseling and guidance or a combination thereof at a level for which endorsement is desired.
5. Completion of C&G 331 — Consultation Techniques.

(An active summer program is available for part-time students. Degree requirements may be completed in three consecutive summers.)

Community Counseling — In reviewing the curriculum available in Counseling and Guidance and Rehabilitation Counseling, the applicant will note that much of the coursework provides the background applicable for employment in general community agency work. Some of our graduates who do not take employment directly in rehabilitation or school settings, find a limited number of opportunities as general counselors in the fields of public welfare, mental health, drug and alcohol counseling, employment security, and corrections.

COUNSELING AND GUIDANCE

(Certificate of Advanced Study)

Admissions

1. Completion of a master's degree in Counseling and Guidance or equivalent comparable to WVU master's degree in Counseling and Guidance with approved practicum experience.
2. A minimum graduate grade-point average of 3.0.
3. A total score of 1,000 on the Graduate Record Examination aptitude test is recommended.
4. Personal interview with faculty members in Counseling and Guidance.
5. Demonstration of competency in counseling, measurement, statistics, and the guidance function in education as evidenced by references and appropriate examinations.
6. Evidence of successful appropriate work experience.
7. Written justification for choice in area of specialization.
8. Three references for recommendation.
9. Plan of study approved by adviser.

Areas of Specialization

Elementary School Counseling
Student Personnel Work
Employment Counseling
Pupil Personnel Services

Secondary School Counseling
Correctional Counseling
Research in Counseling

Requirements for Graduation

- A. Completion of 36 semester hours of approved graduate work.
- B. A minimum grade-point average of 3.2 on all coursework attempted under the Certificate of Advanced Study Program.
- C. Demonstration of competencies as a specialist in chosen area of specialization.
- D. Recommendation of the department.

Program

1. 12 semester hours core from C&G:
385 — Practicum: Advanced-Specialized applications of counseling. 3 hr.
463 — Advanced Theories of Counseling. 3 hr.
466 — Manpower Utilization and Development. 3 hr.
469 — Theory and Practice of Student Appraisal. 3 hr.
2. 12 semester hours elected with adviser's consent in specialty area of advanced courses external to the C&G program area.
3. 6 hours to achieve competence in consumption and production of field research.
4. 6 hours research problem in area of specialization.

Residency (Minimum)

- A. One semester or two summers (12 hr.) on campus.
- B. Program completion of 12 hr. off-campus and transfer, *or* approved inter-university cooperative program.

COUNSELING AND GUIDANCE AND REHABILITATION COUNSELING (Ed.D.)

Doctoral study in counseling and guidance is tailored to individual needs; however, it does require extensive academic and practical work which carries the student beyond the minimum limits established in the College requirements for the Ed.D. degree. In part, the doctoral curriculum is competency based, with a number of alternative learning activities available to meet competency areas. The five broad competency areas include organization, problem identification, intervention strategies, educational theory and technology, and evaluation. In that these competency areas are in a developmental phase, they are subject to revision.

Entrance Requirements

1. Admission to the WVU Graduate School.
2. Completion of a master's degree program in Counseling and Guidance, Rehabilitation Counseling, or equivalent. The equivalency should be comparable to the WVU master's degree program.
3. No minimum grade-point average has been established for admission to the program, except that established by the Graduate School. It is recommended, however, that the student's graduate grade-point average be in the vicinity of 3.5.
4. Complete the aptitude section of the Graduate Record Examination and have the scores of those tests placed on file in the Department. No cut-off score has been established, but most students admitted to the program have a total aptitude score of around 1,000.
5. A personal interview with the faculty is necessary. If this is not possible, we reserve the right to have the applicant be interviewed by a professor in another institution who can make recommendations regarding the student's qualifications for doctoral study.
6. At least three references should be submitted to the Department and should pertain to the individual's competency in counseling, measurement, statistics, research, etc. The references also should contain information regarding the individual's personal characteristics particularly as they relate to the completion of a doctoral program.
7. The application form for a doctoral program should be completed.
8. Upon the completion of the above steps, the materials will be reviewed by the faculty which is usually conducted during the months of February and March. Announcements regarding admission are made on or before March 15. Materials received after March 15 will not be reviewed until the following year. All students not enrolling for courses during the year following admission must reapply before taking coursework.

Comprehensive Examination

Comprehensive examinations must be read by at least four members of the Counseling and Guidance and Rehabilitation Counseling faculty, in addition to those serving on the committee. By arrangement, certain competencies can be validated by means other than the written examination.

Counseling and Guidance

C&G

216. *Behavior Problems and the School*. I, II, S. 3 hr. Emphasis on identification and understanding of students with special needs in areas of social, emotional, and learning problems and in developing remedial programs for these students leading to more satisfactory adjustment within the school situation.
283. *Workshop in Counseling and Guidance*. I, II, S. 1-12 hr. PR: Consent. To take care of credits for special workshops and short intensive limit courses on methods, supervision, and other special topics.
301. *Fundamentals of Counseling*. I, S. 3 hr. PR: Consent. Development and application of basic counseling skills including interviewing, clinical observation, and a general orientation to counseling settings. In setting laboratory experience required.

302. *Human Relationships*. I, II, S. 2-3 hr. Experientially based learning model which focuses on group processes and procedures. Provides self-screening opportunities for prospective counselors. Includes a weekend learning laboratory.
303. *Basic Course in Guidance*. I, II, S. 3 hr. An overview of a total guidance program covering the philosophical, sociological, and psychological foundations of a counseling program, and study of the major theories of vocational choice. A mandatory requirement of 10 hours in either a laboratory or fieldwork experience is required.
305. *Theory and Practice of Human Appraisal*. I, II, S. 3 hr. PR: C&G 303 or proficiency in statistics and consent. All objective measures used in schools; administering and interpreting tests to individuals and groups; developing testing programs and costs. Laboratory experience required to develop proficiency in administration, scoring, and interpretation of selected tests.
306. *Counseling Theory and Techniques*. I, II, S. 3 hr. PR: C&G 303, 305, 320. Seminar study of counseling techniques with coverage of major classical and contemporary theories.
308. *Organization and Development of Counseling and Guidance Services*. II, S. 2 hr. PR: C&G 303, 304, 305, 306. Operation of guidance program in terms of personal functions, relationships, physical facilities, instructional integration, financial standards, law and regulations.
309. *Group Counseling Theory and Techniques*. II, S. 2-3 hr. PR: C&G 306, 307. Theories of group counseling and demonstrations of specific group techniques for advanced Master's and Certificate of Advanced Study candidates in Counseling and Guidance.
310. *Introduction to Student Personnel Work in Higher Education*. I. 3 hr. PR: Consent. A historical and topical study of the development of student personnel structure and functions in higher education.
320. (or Rehab. 320). *Vocational Development and Occupational Choices*. I, II, S. 2-4 hr. PR: C&G 303. Methods of gathering and disseminating occupational and educational information.
330. *Elementary School Guidance*. I, S. 3 hr. PR: Consent. Practical application of the principles of guidance to the elementary school.
331. *Consultation Techniques*. I, II, S. 3 hr. PR: C&G 306 and consent. A specialized multiple training experience covering advanced theory, techniques and practices, skill development in teacher, and parental consulting.
382. *Special Topics*. I, II, S. 1-6 hr. PR: Advanced standing and consent. Independent study and directed readings in specialized areas of counseling and guidance.
385. *Practicum*. I, II, S. 1-12 hr. PR: Preregistration, cleared for graduation at close of semester, or M.A. degree. An intensive supervised practical experience in the public schools in counseling with individual critique and appropriate small group experiences.
395. *Problem in Counseling and Guidance*. I, II, S. 1-12 hr. PR: Consent. Study and research for Master's degree in Counseling and Guidance.
463. *Advanced Theories of Counseling*. I, S. 3 hr. PR: Practicum in counseling, admission to advanced graduate study, and consent. A comprehensive study of the theoretical issues in contemporary counseling.
464. *Individual Intelligence Testing and Interpretation*. I. 4 hr. PR: Advanced standing and preregistration with instructor (9 hr. psychology and demonstration of proficiency in measurement needed for admission). Administering, scoring, and interpreting individual mental ability tests.

466. *Manpower Utilization and Development*. II. 3 hr. PR: Advanced standing and consent. Economic, social, and political implications of manpower utilization and the role of the counselor to assist society with its pressing demands.
469. *Advanced Theory and Practice of Human Appraisal*. II, S. 3 hr. PR: Stat. 311, C&G 305, and consent. Analysis of and supervised practice in the use of major standardized and local assessment instruments typically used in vocational and educational guidance and counseling. Factors in the management and development of coherent testing programs.
472. *Internship in Student Personnel Work*. I, II. 1-12 hr. PR: C&G 310 and admission to Certificate of Advanced Studies or Doctoral program in Counseling and Guidance. Designed to offer advanced graduate students an opportunity to practice under close supervision professional skills required in the broad field of student personnel work in higher education.
480. *Seminar*. I, II, S. 1-6 hr. PR: Advanced standing and consent. Seminar for Certificate of Advanced Studies and Doctoral students in Counseling and Guidance.
490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Intended for graduate students with college teaching responsibility. Provides a supervised experience for graduate students in a teaching situation. (Grade S/U.)
491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced areas of Counseling and Guidance and Rehabilitation Counseling.
492. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
493. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
494. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
495. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Designed to permit each graduate student an opportunity to present his research to the assembled faculty and graduate student body. (Graded as S/U.)
497. *Research*. I, II, S. 1-15 hr. PR: Consent. Dissertation.
498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.
499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not registered in regular coursework but who have need to use University facilities for completion of their research or program.

Rehabilitation Counseling

Rehab. Counsel.

300. *Introduction to Rehabilitation Services*. I, II. 2 hr. PR: Junior standing and 15 hr. in social science or education or consent. The processes by which certain human conditions may be ameliorated by social and vocational rehabilitation services, in particular, counseling and evaluation. Emphasis on historical survey, philosophy and concepts of rehabilitation and case service techniques to assist individuals with physical, mental, and/or social handicaps.
310. *Medical Aspects of Rehabilitation*. I, II. 3 hr. PR: Junior standing and 15 hr. in social science or education or consent. Medical needs of handicapped persons in the rehabilitation process from time of referral through placement and case closure.
312. *Psychological Aspects of Disability*. I, II. 3 hr. PR: Graduate standing and consent. Psychodynamics of adjustment to atypical physique and prolonged infirmity. Includes a study of somatopsychology.

314. *Special Problems in Rehabilitation.* I, II. 1-3 hr. PR: Graduate standing and consent. Rehabilitation theory and techniques in problems such as blindness, epilepsy, and mental retardation. Concentrated study in special institutes.
320. *Vocational Development and Occupational Choices.* I, II. 3 hr. PR: Graduate standing in social sciences or education. Vocational development theory, occupational choice, problems of maturation and work attitudes, techniques of job evaluation, and socio-economic implications of a changing occupational structure.
374. *Field Work in Rehabilitation.* I, II, S. 1-6 hr. PR: Consent. Supervised field work experience in rehabilitation settings to provide rehabilitation counseling students with a more adequate orientation to their profession.
462. *Clinical Conference in Rehabilitation.* I, II, S. 3 hr. PR: Graduate standing and consent. Analysis and integration of the clinical methods essential to facilitating the rehabilitation process.
472. *Counseling Practicum.* I, II. 3 hr. PR: Graduate standing and consent. Supervised experience in the application of counseling techniques in the rehabilitation process.
475. *Clinical Practice.* I, II, S. 1-12 hr. PR: Consent, following at least one academic semester in classroom. Clinical practice (internship) in selected agencies, rehabilitation centers, clinics, or hospitals conducting an organized program of services for the physically, mentally, emotionally, or socially handicapped. Practice will be under direct supervision of faculty and agency personnel.
480. *Seminar.* I, II, S. 1-12 hr. PR: Consent. Administration of programmatic research; legal and ethical issues in research and service programs, etc.
481. *Special Topics.* I, II, S. 1-6 hr. PR: Consent. Contemporary issues in the behavioral sciences and rehabilitation.
482. *Workshop in Rehabilitation.* I, II, S. 1-12 hr. PR: Consent. Supervision in the counseling process; vocational evaluation in rehabilitation; utilization of rehabilitation research; contemporary issues in rehabilitation.
491. *Directed Study and Research.* I, II. 1-6 hr. PR: Consent. Readings and/or independent research in a rehabilitation related topic.
497. *Research.* I, II, S. 1-15 hr.

SPECIAL EDUCATION

The Special Education programs at the master's degree level are designed to prepare master-clinical teachers of special education children and/or to provide initial training for the preparation of future supervisors and administrators of public school special education programs.

The post-master Special Education programs leading to the Certificate of Advanced Study and the Doctor of Education are individually prescribed programs. These programs are designed to prepare supervisors, administrators, and researchers. The advanced training of graduates who major in special education at the doctoral level prepares them for positions in higher education. Students who wish to plan interrelated programs in Learning Disabilities and Behavioral Disorders should contact the Special Education Department Chairman.

Curriculum for Special Education

Master of Arts (36 Semester Hours Minimum)

Hours

A. Core Area Requirements

(12 Semester Hours in All Master Degree Programs)	
Sp. Ed. 250 — Survey of Exceptional Children and Adults	3
C&G 305 — Theory and Practice of Human Appraisal	3
Psych. 281 — Abnormal Psychology <i>or</i>	
Psych. 263 — Introduction to Personality <i>or</i>	
Psych. 264 — Psychology of Adjustment.....	3
SPA 342 — Advanced Speech Pathology	3
Total.....	12

B. Teaching Certification Mental Retardation Area Requirements

Sp. Ed. 255 — Introduction to Mental Retardation.....	3
Sp. Ed. 260 — Curriculum and Methods for Special Education	3
Sp. Ed. 305 — Mathematics for the MR	3
Sp. Ed. 306 — Reading for MR Children.....	3
Sp. Ed. 487 — Practicum	3-6
Total.....	15-18
Elective Requirements Mental Retardation Area.....	6-9

C. Teaching Certification Learning Disabilities Area Requirements

Sp. Ed. 260 — Curriculum and Methods for Special Education	3
Sp. Ed. 330 — Introduction to Specific Learning Disabilities	3
Sp. Ed. 331 — Evaluative Techniques in Specific Learning Disabilities	3
Sp. Ed. 332 — Teaching Strategies of Specific Learning Disabilities.....	3
Rdng. 342 — Reading Diagnosis & Prescription in Learning Disabilities.....	3
Sp. Ed. 487 — Practicum	3-6
Total.....	18-21
Elective Requirements Learning Disabilities Area.....	3-6

D. Teaching Certification Behavioral Disorders Area Requirements

Sp. Ed. 260 — Curriculum and Methods for Special Education	3
Sp. Ed. 340 — Introduction to Behavioral Disorders.....	3
Sp. Ed. 341 — Behavioral Dynamics in the School and Community	3
Sp. Ed. 342 — Curriculum and Methods for the BD Child.....	3
Sp. Ed. 487 — Practicum	3-6
Total.....	15-18
Elective Requirements Behavioral Disorders Area.....	6-9

E. Problem or Thesis Area Requirements

Sp. Ed. 395 — Problem in Special Education <i>or</i>	
Sp. Ed. 497 — Research	3-6
Sp. Ed. 480 — Seminar.....	3
Stat. 311 — Statistical Methods <i>or</i>	
Ed. Psych. 320 — Introduction to Research.....	3

Total.....	9-12
Elective Requirements	12-15

F. Approved Electives

C&G 305, 464.
 C&I 330, 333, 340, 438.
 Ed. Found. 320, 340.
 Ed. Psych. 300, 320, 330, 333, 341, 342, 343, 350, 420, 440, 450, 451.
 Psych. 263, 264, 271, 281, 282, 322, 423.
 Rdng. 283, 321, 324, 325, 330, 331, 340, 342.
 Sp. Ed. 262, 265, 271, 280, 281, 305, 306, 330, 331, 332, 340, 341, 342, 365, 381, 395, 480, 487, 496.
 Stat. 311, 312.

Special Education

Sp. Ed.

250. *Survey of Exceptional Children and Adults.* I, II, S. 3 hr. PR: Consent. Introduction to all areas of exceptionality. Definition, psychological and educational characteristics, and social and vocational adjustment.
255. *Introduction to Mental Retardation.* I, II, S. 3 hr. PR: Consent. Historical, etiological, social, educational, and vocational aspects of mental retardation.
260. *Curriculum and Methods for Special Education.* I, II, S. 3 hr. PR: Sp. Ed. 250, 255 and/or consent. Organization of instruction and adaptation of teaching methods in the several curricula areas and the construction of materials.
262. *Curriculum and Methods for the Trainable Mentally Retarded.* I, II, S. 3 hr. PR: Sp. Ed. 250, 255 and/or consent. Analysis of special problems of curriculum development for the trainable child and adult and provisions for development of original construction of curricula materials.
265. *Industrial Arts in Special Education.* II, S. 3 hr. Experimentation with industrial arts and crafts suitable for instruction in special education classes. Discussion of factors involved in selection and manipulation of such media as leather, plastics, ceramics, wood, and metal.
271. *Curriculum, Materials, and Methods for Mentally Gifted.* I, II, S. 3 hr. History and philosophy, identification, curriculum, materials and methods of working with mentally gifted.
280. *Student Teaching Clinical Experience in Special Education.* I, II, S. 1-6 hr. PR: Consent. Student teaching with the mentally retarded.
281. *Special Problems and Workshop in Special Education.* I, II, S. 2-4 hr. PR: Consent. To take care of credits for special workshops and short intensive unit course on methods, supervision, and other special topics.
305. *Mathematics for the Mentally Retarded.* I, S. 3 hr. PR: Consent. Materials and methods for teaching mathematics to the mentally retarded child.
306. *Reading for Mentally Retarded Children.* I, S. 3 hr. Designed especially for majors in special education. Emphasizes the techniques, methods, and materials most effective for teaching reading to mentally retarded.
330. *Introduction to Specific Learning Disabilities.* I, II, S. 3 hr. PR: Consent. Historical, etiological, educational, and legislative aspects of, and multidisciplinary approaches to, the learning disabled child.

331. *Evaluative Techniques in Specific Learning Disabilities*. I, II, S. 3 hr. PR: C&G 305 and consent. Administration, interpretation, report writing, and educational implications of selected tests appropriate to the diagnosis of learning disabilities.
332. *Teaching Strategies of Specific Learning Disabilities*. I, II, S. 3 hr. PR: Sp. Ed. 330. Curriculum planning, informal diagnosis, techniques, teaching strategies in specific areas, opportunities to use strategies in student designed programs.
340. *Introduction to Behavioral Disorders*. I, II, S. 3 hr. PR: Consent. Historical trends in the education of the behaviorally disordered child. Educational and behavioral management techniques and trends for the future.
341. *Behavioral Dynamics in the School and Community*. I, II, S. 3 hr. PR: Consent. Theories of behavioral dynamics, including several distinct approaches, which relates to specific problems in the school, home, and community. Agencies available to the behaviorally disordered child and his family.
342. *Curriculum and Methods for the Behaviorally Disordered Child*. I, II, S. 3 hr. PR: Consent. Development of appropriate curriculum based upon individual needs of the child. Practical application of a variety of methods used in the instruction of the behaviorally disordered child in the classroom. Research and data collection, case studies.
365. *Administration and Supervision of Programs for Exceptional Children*. I, II, S. 3 hr. PR: Consent. Administration and supervision with attention to: selection and placement procedures; facilities and equipment; local, state, federal legislation; and philosophy and recent research.
381. *Special Topics*. I, II, S. 1-6 hr. PR: Consent. Special topics or research in mental retardation and in exceptional children and adults.
395. *Problem in Special Education*. I, II, S. 3 hr. Research for master's degree in special education.
480. *Seminar*. I, II, S. 1-6 hr. PR: Consent. Special topics concerned with the educational, sociological, and psychological aspects of special education.
487. *Practicum*. I, II, S. 1-12 hr. PR: Consent. Internship, advanced student teaching, and administration and supervision practicum.
496. *Project in Special Education*. I, II, S. 3-6 hr. Research for the program leading to the Certificate of Advanced Study in Special Education.
497. *Research*. I, II, S. 1-15 hr.

SPEECH PATHOLOGY AND AUDIOLOGY

Master of Science in Speech Pathology and Audiology

Applicants who possess a bachelor's degree from an accredited college or university may be admitted to a program leading to candidacy for the degree of Master of Science in Speech Pathology and Audiology, provided they:

1. Present evidence of ability to pursue graduate work successfully as measured by Graduate School and divisional standards for admission.

2. Attain an overall grade-point average of 2.75 or above as evidenced by an official transcript. This transcript must be made available to the Office of Admissions and Records and the Speech Pathology and Audiology Graduate Student Acceptance Committee. Any deficiencies in undergraduate preparation will be made up either without credit or for additional credit required for the master of science degree.

3. Provide evidence of the personal qualities predictive of professional success through written letters of recommendation by three individuals in the

academic community. These letters must be submitted to the Office of Admissions and Records with copies to the Speech Pathology and Audiology Graduate Student Acceptance Committee.

Deadlines for submitting applications and the material requested in items 1-3 are March 1 for the summer session and first semester and November 1 for the second semester.

Of the applicants under consideration, the Speech Pathology and Audiology Graduate Student Acceptance Committee will accept those whom they believe will meet with success in the graduate program. The number of applicants accepted will depend upon the number of qualified applicants, the size of the Speech Pathology and Audiology graduate faculty, and the facilities available for acceptable academic, clinical, and research training.

If, at any time, the student's academic average falls below 3.0 or if the student has more than 5 semester hours of C or below, the student will be dismissed from the program with no probationary status. Once the student has taken 15 hours of Speech Pathology and Audiology courses, the academic and professional performance will be evaluated by the faculty at a preliminary evaluation.

Requirements for completion of the Master of Science degree in Speech Pathology and Audiology are:

1. A minimum of 36 semester hours of approved graduate courses in speech and hearing sciences, speech pathology, audiology, and other related areas as may be required to attain professional competence. The student may elect to take up to 6 semester hours of thesis credit in attaining the 36-hour minimum. The student must achieve not less than a 3.0 average for all courses taken for credit toward the graduate degree.

2. Successful performance on comprehensive examinations according to Graduate School and divisional standards.

3. Demonstration of professional competence in speech and/or hearing as measured by fulfillment of the academic and clinical practicum requirements established by the faculty.

4. A *minimum* of four semesters is recommended for master's candidates with a background in speech and hearing. Two of these four semesters may include summer sessions. For candidates without a background in speech and hearing, a minimum of six semesters is recommended for completion of the master's degree.

Doctor of Education in Speech Pathology and Audiology

Placed under temporary moratorium by the program faculty for an indefinite period, effective January 1, 1968.

Speech Pathology and Audiology

SPA

220. *Introduction to Audiology*. I. 4 hr. PR: Consent. Gross anatomy and physiology of the auditory mechanism; physics of acoustic signal production; basic audiometric techniques and interpretation.
222. *Hearing Conservation*. I. 2 hr. PR: SPA 157 or consent. Investigation of trauma (varied) on auditory sensitivity and acuity; identification audiometry; approaches to hearing conservation.

223. *Aural Rehabilitation*. II. 3 hr. PR: SPA 220 or consent. Rehabilitative approaches to management in the auditorially handicapped individual. Medical, audiological, and social aspects of rehabilitation. Procedures of speech reading and auditory training will be examined and evaluated.
241. *Problems in Speech Pathology*. I, II. 3 hr. PR: Consent. The speech pathologist as a diagnostician and therapist in interdisciplinary investigations. Counseling procedures, administrative practices in varied settings, and organization of programs of various pathologies of speech.
250. *Survey of Oral Communication Disorders*. II. 3 hr. (Non-majors) PR: Consent. Basic concepts and principles of the disorders of speech and their treatment. Orientation course for students majoring in speech communication, as well as teachers, school administrators, psychologists, and rehabilitation workers.
251. *Advanced Speech Correction*. II. 3 hr. PR: SPA 150. Organically based disorders including cleft palate and voice disorders.
252. *Stuttering*. I. 3 hr. PR: SPA 156. Theories and therapies of stuttering.
253. *Profound Organic Speech Disorders*. II. 3 hr. Speech and language disorders related to cerebral injury. Aphasia and cerebral palsy.
263. *Preschool Deaf Child*. I, S. 3 hr. PR: SPA 157. Importance of early detection and education, language development of the congenitally deaf child, and parents' role in early childhood education.
281. *Special Topics*. I, II, S. 1-6 hr. per sem. (Max. credit 6 hr.). PR: Consent. Independent study in speech pathology, audiology, and speech and hearing sciences.
282. *Clinical Practice in Speech*. I, II, S. 1-6 hr. PR: Consent. Supervised diagnosis and therapy of speech disorders. (May be taken for a maximum of 3 semester hours per semester for undergraduate or graduate credit.)
283. *Clinical Practice in Hearing*. I, II. 1-6 hr. PR: Consent. Supervised diagnosis and therapy of hearing disorders. (May be taken for a maximum of 3 semester hours per semester for undergraduate or graduate credit.)
321. *Structure and Function of the Auditory System*. I. 3 hr. PR: Consent. Detailed study of the gross and microscopic anatomy of the auditory system, and detailed investigation of physiological aspects of auditory sensitivity and acuity.
322. *Audiology and Audiometry*. I. 3 hr. PR: SPA 220 or equiv. Various audiological techniques that are utilized in the differential diagnosis of auditory dysfunctioning. Administration and interpretation of diagnostic techniques.
323. *Bone Conduction Audiometry*. II. 3 hr. PR: SPA 321, 322. An advanced consideration of the anatomical and physiological mechanisms involved in transmission of acoustic signals through the skull. Audiological problems in clinical bone conduction audiometry.
324. *Speech Audiometry*. I. 3 hr. PR: SPA 321, 322. Basis for the application of hearing for speech tests in assessing communication systems. Analysis of auditory processing of complex signals and the role of complex signal processing in the differential diagnosis of auditory dysfunction.
325. *Hearing Aids*. II. 3 hr. PR: SPA 322. Electronic design of amplification systems and acoustic analysis of amplification systems. Hearing aid evaluation procedures.
328. *Clinical Administration Audiology*. I. 3 hr. PR: Consent. Procedures for initiating and maintaining audiological services in the medical, public school, and community clinical environment.
329. *Acoustic Instrumentation*. II. 3 hr. PR: SPA 158, 322. Electronic design utilized in clinical auditory testing and amplification. Evaluation and assessment of hearing aids in aural rehabilitation.

340. *Experimental Phonetics*. II. 3 hr. PR: SPA 153 and consent. Problems of phonetics as related to functional speech. Instruments used in sound analysis. Various aspects of architectural acoustics.
342. *Advanced Speech Pathology*. II. 3 hr. PR: SPA 251 and consent. Theories of causation and therapies for delayed language development, cleft palate, and cerebral palsy.
343. *Neurophysiological Basis of Speech and Language*. I. S. 3 hr. PR: SPA 154, 253, or consent. General and typographic anatomy of CNS, with special attention to motor and sensory systems as they apply to speech, hearing, and language.
382. *Advanced Clinical Practice in Speech*. I, II, S. 1-6 hr. PR: Consent. Emphasis on diagnosis of speech disorders and appropriate therapeutic follow-up. Patient staffing experience in a multi-disciplined environment.
383. *Clinical Practice in Audiology*. I, II. 1-6 hr. PR: SPA 220 or equiv. May be taken in conjunction with SPA 322. Supervised experience in administration and interpretation of audiological evaluative procedures. Application of therapeutic techniques in aural rehabilitation.
387. *Special Topics*. I, II. 1-6 hr. PR: Consent. Open to graduate students in speech pathology and audiology who are pursuing independent problems in that field. (May be repeated.)
480. *Seminar*. I, II, S. 1-6 hr. PR: Consent. Topics vary from semester to semester to meet student needs. Organic speech impairment, speech pathology research, aural rehabilitation research, medical audiology research, etc.
497. *Research*. I, II. 1-15 hr.

EDUCATION

The program area of Education is comprised of resident courses of instruction and facilities for research and cooperating elementary and secondary schools for supervised student-teaching experience with opportunities for observing, student teaching, directed supervision, and experimentation.

Programs are accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary teachers, secondary teachers, school service personnel, and school administrators, with the doctoral degree the highest degree approved.

Master of Arts

Requirements for Admission to Graduate Work in Education

It is the responsibility of all applicants for admission and all candidates for graduate degrees and certificates to conform to the general regulations of the Graduate School.

Requirements for Admission to Candidacy for the Master's Degree in Education

Graduate students apply to the Office of Admissions and Records for admission. Scores on the aptitude test of the Graduate Record Examination should accompany the application but must, in all cases, be submitted to the respective department before completion of the first 15 semester hours of graduate study. Students may take no more than 9 semester hours off-campus before completion of at least 6 semester hours in residence.

Students may be admitted as degree candidates on submission of an undergraduate grade-point average of 2.5. These students may pursue the program of their choice immediately.

Students who do not meet the admission requirements and have a grade-point average of 2.25 or better, may take a maximum of 9 semester hours of coursework. At the end of this period students may apply to the respective department for review of their admissions classification. Re-classification will be considered *only* in cases in which the student has achieved a *minimum* grade-point average of 2.75 for the first 9 semester hours of graduate study. All work taken up to the conclusion of the semester in which the ninth semester hour is earned will be used in computing the grade-point average. If the student is not reclassified to degree program status by the department, the student is not eligible to continue graduate study in the Division of Education. The student may, upon petition to the department chairman, be permitted to take additional coursework for the renewal of the teaching certificate.

Optional Routes Towards a Master's Degree in Education

A. Thirty semester hours, including 6 semester hours of research. Examination (oral, written, or both, at the discretion of the candidate's advisory committee).

B. Thirty semester hours, including 3 semester hours of research, selected in conference with the candidate's committee, directed by the adviser, with final approval by the committee and 27 semester hours of course work. Examination (oral, written, or both, at the discretion of the candidate's advisory committee).

C. Thirty-six semester hours. Examination (oral, written, or both, at the discretion of the candidate's advisory committee).

D. Program options D and E are offered in several programs.

Special Requirements for the Master's Degree in Education

1. No student may be awarded a master's degree in Education unless the student has a minimum grade-point average of 2.75 on all work taken for graduate credit. (A grade of less than C does not carry credit toward a graduate degree, but will be counted in determining the grade-point average.)

2. No student will be permitted to repeat a required graduate course more than once.

3. Fifteen semester hours of approved courses off-campus may apply toward the completion of degree requirements, if no work is transferred from another institution. A maximum of 12 hours of approved off-campus courses may be used for certification.

4. The maximum number of hours which may be used from off-campus courses and transfer credit combined is 15.

5. Students are limited to earning 9 hours in any one field off-campus.

6. Students must submit an application to take the final master's degree examination within the first week of the summer term or two weeks of the semester in which they intend to take it. All applications should be submitted to the College's Office of Student Advising and Records.

All persons working toward administrative certificates in Education or who wish to add additional administrative certification shall be required to pass a screening examination of the Department of Education Administration.

A candidate who fails the final master's degree examination may, upon written consent of the student's advisory committee, be given a second examina-

tion not earlier than the following term or semester. A candidate who fails the second examination may, upon written request and with the unanimous consent of the committee, be given a third and final trial no earlier than one calendar year from the date of the second examination.

GRADUATE PROFESSIONAL EDUCATION CURRICULA

Graduate professional education curricula are offered in four major areas:

- I. *Administration*
 - The Principalship
 - The Superintendency
- II. *Curriculum and Instruction*
 - Elementary-School Classroom Teachers
 - Early Childhood Education
 - Reading
 - Secondary-School Classroom Teachers
 - Supervisors of Instruction
 - Teacher Librarians
 - Technology Education
- III. *Health Education*
- IV. *Reading*

The administrative certificates issued by the State Department of Education for superintendents, principals (elementary and secondary), and supervisors are Professional Administrative Certificates.

Education Administration

The Department of Education Administration offers graduate programs leading to the degrees of Master of Arts, Certificate of Advanced Study, and Doctor of Education, as well as professional preparation for certification in principalship, supervision, and superintendency.

Admission Requirements. All applicants must comply with the requirements of the Graduate School, the College of Human Resources and Education, and the Department of Education Administration. Admission to all programs is contingent on assessment of: (1) complete official transcripts of all higher education work attempted, and (2) whatever other evidence the faculty may deem necessary to judge probable success in a graduate program.

Master of Arts. Optional thesis or hours programs are available in the elementary and secondary school principal programs (minimum of 18 Education Administration hours) and the general and special supervisor programs. An internship is optional in principal programs but required for certification in supervision programs. In order to graduate the student must obtain at least a 3.25 grade-point average on all program work attempted. If the thesis option is selected, an approved research project must be completed.

Certificate of Advanced Study. Advanced work beyond the master's degree may be taken with an emphasis in school district central office administrator or in principalship. A research project is required. In order to graduate the student must defend the research project and obtain at least a 3.25 grade-point average on all program work attempted.

Doctor of Education. The Doctor of Education degree is offered with an emphasis on public school administration, higher education or major education organizations, such as state departments of education. Within the regulations of the Graduate School, the College of Human Resources and Education, and the Department of Education Administration, each program is individually designed by the doctoral student, the student's adviser, and doctoral committee to meet the student's career aspirations.

Education Administration

Ed. Adm.

300. *Public School Organization and Administration.* I, II, S. 3 hr. Basic concepts through which administrators, supervisors, and teachers gain understanding of general problems related to operation of schools and school systems.
312. *Principalship.* I, II, S. 3 hr. PR: Consent. School building administration emphasizing planning, policy formulation, decisionmaking, and managerial practices.
315. *Superintendency.* I, II, S. 3 hr. PR: Consent. Roles, relationships, behaviors and competencies which characterize the school superintendent and his staff.
318. *School Business Administration.* I, II, S. 3 hr. PR: Consent. Sound business administration for central office school administration.
320. *Staff-Personnel Administration.* I, II, S. 3 hr. PR: Consent and Ed. Adm. 300. Selection, induction, direction, evaluation, improvement and promotion of members of the administrative, supervisory, instructional, research, clerical and maintenance staffs.
321. *Pupil-Personnel Administration.* S. 3 hr. PR: Consent. Pupil accounting, guidance, extracurricular activities and control.
330. *Principles of Education Leadership.* I, II, S. 3 hr. PR: Consent. Problems of school leaders in the areas of administration, supervision, and instruction.
331. *Principles of Supervision.* I, II, S. 3 hr. PR: Consent. Elementary, junior high, and senior high supervision.
332. *Education Administration Theory.* I, II, S. 3 hr. PR: Consent. Interdisciplinary study of the major concepts of educational administration theory and the application to educational settings.
333. *School Law.* I, II, S. 3 hr. PR: Consent. Overview of the generally accepted legal principles which affect the student, teacher, and principal in a public school setting.
340. *Economics of Public Education.* S. 3 hr. PR: Consent. Basic concepts.
341. *School Buildings and Equipment.* I, II, S. 3 hr. PR: Consent. Philosophy, planning, and management of the school plant.
342. *Public Education and the Law.* I, II, S. 3 hr. PR: Ed. Adm. 333 or consent. Legal permissives and limitations involved in setting policy for organization of, and administration of public schools.
350. *Internship.* I, II, S. 2 hr. May be repeated for a maximum of 8 hr. credit. PR: Consent. Public school internship in administration and supervision.
360. *Development of Administration in American Higher Education.* I, II, S. 3 hr. The administrative development of American higher education from 1636 to the present, including internal trends and external forces.
361. *Higher Education Administration.* I, II, S. 3 hr. Organization and administration of higher education institutions.

362. *Higher Education Law.* I, II, S. 3 hr. Critical legal issues of higher education — public and private — using a case study approach.
363. *Higher Education Finance.* I, II, S. 3 hr. Financial concerns in higher education with emphasis on taxation and legislative actions, sources of income, budgeting, and cost analysis.
364. *Issues in Higher Education.* I, II, S. 3 hr. Current societal and institutional issues which tend to shape the mission and life style of an institution.
365. *Institutional Research and Planning.* I, II, S. 3 hr. Accumulation, analysis, and interpretation of data relevant to decision-making and the allocation of institutional resources.
366. *The College Student.* I, II, S. 3 hr. Review of research and literature on college students from freshmen through graduate school. Emphasis on student subcultural patterns.
367. *Higher Education Collective Bargaining.* I, II, S. 3 hr. The process and content of collective bargaining in higher education and its impact on institutional governance and academic jurisdictions.
368. *Community and Junior Colleges.* I, II, S. 3 hr. Development, role, functions, organization, and curriculum of community and junior colleges in the United States, with special emphasis on West Virginia.
369. *Higher Education Internship.* I, II, S. 3 hr. Practical experiences in the administration of an organizational unit under supervision of the unit's chief administrator. (May be repeated for credit.)
370. *Adult and Continuing Education.* I, II, S. 3 hr. Principles, concepts, and processes involved in programming for adults in a community setting. Nature of adult learning, subject matter, and learning environment.
385. *Practicum.* I, II, S. 1-12 hr. PR: Consent.
470. *Interdisciplinary Approaches for School Administrators.* II. 3 hr. PR: Consent. Study of education administration using simulation and pertinent academic materials.
480. *Seminar.* I, II, S. 1-6 hr. PR: Consent.
485. *Special Topics.* I, II, S. 1-6 hr. PR: Consent.
490. *Teaching Practicum.* I, II, S. 1-3 hr. PR: Consent. Supervised practices in college teaching.
491. *Advanced Study.* I, II, S. 1-6 hr. PR: Consent. Advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
496. *Graduate Seminar.* I, II, S. 1 hr. PR: Consent.
497. *Research.* I, II, S. 1-15 hr. PR: Consent.
499. *Graduate Colloquium.* I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking coursework credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.

Curriculum and Instruction

Curriculum for Elementary School Classroom Teachers

Master of Arts

I. Required Courses	Program A ¹	B ¹	C ¹
Ed. Psych. 330.....	3	3	3
Ed. Psych. 320.....	3	3	0
C&I 350.....	3	3	3
C&I 340.....	3	3	3
C&I 330.....	3	3	3
Rdng. 324.....	3	3	3
Ed. Found. 320.....	3	3	3
C&I 301.....	3	3	3
C&I 391.....	0	3	0
C&I 497.....	6	0	0
Total.....	30	27	21
II. Approved Electives.....	0	3	0-15
(At least 9 hr. must be in courses not offered by Education or Clinical Studies.)			
III. Specialization.....	0	0	0-15
Total for Master's Degree.....	30	30	36

A¹— Thesis required.

B¹— Research Problem required.

C¹— 36 semester hour program for classroom teacher.

Curriculum for Early Childhood Education

Master of Arts

I. Required Courses	Program A ¹	B ¹	C ¹
C&I 312.....	3	3	3
C&I 314.....	3	3	3
C&I 316.....	3	3	3
Rdng 381.....	3	3	3
CDFR 341.....	3	3	3
Ed. Psych. 330.....	3	0	0
C&I 391.....	0	3	0
C&I 498.....	6	0	0
Total.....	24	18	15
Electives.....	6	12	21
Total for Master's Degree.....	30	30	36
II. Approved Electives			
Early Childhood Education.....			3-12
Other Education.....			6-18
Non Education.....			0-12

A¹— Thesis required.

B¹— Research problem required.

C¹— 36 semester hour program for classroom teacher.

Curriculum for Secondary School Classroom Teachers

Students who wish to pursue a program in Home Economics Education must enroll in the Division of Family Resources.

Master of Arts

I.	Graduate Courses in Education.....	12-18 Hr.
	Required Courses	6 Hr.
	Program A ¹ B ¹ C ¹	
	C&I 304	3 3 3
	Ed. Found. 320 or C&G 303.....	3 3 3
	Ed. Psych. 330.....	3 3 0
	Ed. Psych. 320.....	3 3 0
	C&I 391	0 3 0
	C&I 497	6 0 0
	Total.....	18 15 6
II.	Approved Electives.....	6 Hr. (min.)
III.	Graduate Courses in one of the candidate's certified fields.....	12-18 Hr.
	(Candidates with Library Science as a major teaching field must follow the Teacher-Librarian curriculum.)	
IV.	Graduate Courses in another of the candidate's teaching fields.....	6 Hr. (min.)
	(This does not apply to candidates pursuing Programs A or B.)	

Alternate Program for II, III, IV

I.	Graduate Courses in one of the candidate's certified teaching fields.....	18-24 Hr.
II.	Free electives.....	0-6 Hr.
	Total for Master's Degree	30-36 Hr.

A¹— Thesis required.
B¹— Research problem required.
C¹— 36 semester hour program for classroom teacher.

Curriculum for Technology Education

The Technology Education program offers graduate programs leading to degrees of Master of Arts, Certificate of Advanced Study, and Doctor of Education. This program is involved in the SREB Academic Common Market. Students from the southern region (10 southern states) should inquire about paying in-state tuition.

Admission Requirements. All applicants must comply with the requirements of the Graduate School, the College of Human Resources and Education, and the Technology Education program. Admission to the Ed.D. program is contingent upon assessment of: (1) complete official transcripts of all higher education work attempted, and (2) a screening interview which is held during the student's first semester of coursework.

Master of Arts

I. Suggested Courses	Option A ¹	B ¹	C ¹	D ¹
(All graduate programs designed by student and adviser to meet student's specific needs.)				
Ed. Psych. 320 — Intro. to Research.....	3	3	3	3
Ed. Psych. 330 — Adv. Ed. Measurement	3	3	3	3
T.E. 300 — Contemp. Prob. in Trans.....	3	0	0	3
T.E. 301 — Tech. Dev. in Trans.....	3	0	0	3
or				
T.E. 310 — Contemp. Prob. in Comm.	0	3	0	3
or				
T.E. 311 — Tech. Dev. in Comm.	0	3	0	3
or				
T.E. 320 — Contemp. Prob. in Prod.....	0	0	3	3
T.E. 321 — Tech. Dev. in Prod.....	0	0	3	3
T.E. 385 — Interdisciplinary Seminar.....	3	3	3	3
T.E. 400 — Technology: Hist. and Dev.	3	3	3	3
T.E. 404 — Read. in Tech. and Culture	3	3	3	3
T.E. 498 — Thesis.....	—	—	—	—
Total.....	21	21	21	28
II. Electives	15	15	15	8
Total.....	36	36	36	36

Electives are selected from University offerings and must contribute to program objectives. Prior approval of the adviser is required.

Doctor of Education

The Doctor of Education degree is offered with an emphasis on the study of technology as a discipline base. This program is competency based and allows each student to individually design the student's doctoral program to meet career aspirations.

Curriculum for Health Education

A combination of undergraduate courses and courses in the graduate program is necessary to meet certification requirements.

Master of Arts

I. Required Courses (6 Semester Hours)	
C&I 304 — Secondary School Curriculum	3
Ed. Found. 320 — Philosophy of Education	
or	
C&G 303 — Basic Course in Guidance.....	3
II. Elective Courses (with consent of adviser — 12 Semester Hours)	
Ed. Psych. 280 — Audio-Visual Resources for Instruction	3
Ed. Psych. 330 — Advanced Education Measurement	3
Ed. Psych. 361 — Communication and Education Media	3
Ed. Psych. 440 — Human Development and Behavior	3
Ed. Psych. 450 — Psychological Foundations of Learning	3
Ed. Psych. 451 — Principles of Instruction.....	3

CDFR 246 — Adolescent Development	3
Ed. Found. 300 — Sociology of Education	3
Ed. Found. 340 — Historical and Sociological Foundation of American Education	3
III. Required Health Education Courses (18 Semester Hours)	
Health Ed. 301 — Advanced School Health	3
Health Ed. 305 — Philosophy of Health Education	3
Health Ed. 306 — Community Health	3
Health Ed. 376 — Evaluation of Health Information	3
Health Ed. 497 — Individual Research Problems in Health Education	3

Curriculum for Teacher-Librarians

A combination of undergraduate courses and courses in the graduate program is necessary to meet certification requirements.

Master of Arts in Education

I. Graduate Courses in Education.....	12 Hr.
A. Required Courses in Education.....	9 Hr.
Ed. Psych. 260	
Ed. Psych. 320	
C&I 391	
B. Approved Electives	3 Hr.

Curriculum and Instruction

C&I

205. *The Junior High School.* I, II. 2 hr. PR: Consent. Developing philosophy, program, and practices of the junior high school.
210. *Early Childhood Education.* I, II, S. 3 hr. PR: CDFR 141, 142. Role that early childhood education plays in development of child. Scope, content, and nature of programs for young children as well as developing knowledge, skills, and attitudes necessary for working in such programs. Students observe and participate in early childhood programs and engage in research at this level.
211. *Early Childhood Education.* II. 3 hr. PR: CDFR 142. Continuation of C&I 210.
237. *Mathematics in the Junior High School and Middle School.* SII. 3 hr. PR: 6 hr. of college mathematics or consent. Teaching mathematics in junior high school or middle school; application of mathematics content to teaching; instructional techniques and materials.
267. *The Music Education Program.* S. 3 hr. PR: Consent. Organization and administration of the complete music education program for grades 1-12.
278. *Vocational Home Economics in Secondary Schools.* I. 3 hr. PR: Ed. Psych. 106; 25 hr. in family resources.
279. *Organization Administration of Physical Education.* 3 hr. (Also listed as P.E. 192.)
280. *Special Problems and Workshops.* I, II, S. 2-4 hr. PR: 14 hr. in education. To take care of credits for special workshops and short intensive unit courses on methods, supervision, and other special topics. Maximum of 8 semester hours may be applied toward the master's degree, of which no more than 6 semester hours will be in off-campus extension.

287. *Student Teaching Clinical Experience in Elementary or Secondary Education*. I, II, S. 2-4 hr. PR: Consent. Advanced course in student teaching, stressing clinical procedures in classroom learning problems.
288. *Clinical Practices in Public-School Speech and Hearing Therapy*. I, II, S. 2-8 hr. PR: Consent. Includes experience in grades 1 to 12. Meets the requirements of SPA 282 and 283.
301. *The Elementary-School Curriculum*. I, S. 3 hr. PR: 20 hr. of undergraduate credit in elementary education, or consent. Analysis of curriculum designs in elementary education with emphasis on methods and techniques of development.
304. *The Secondary-School Curriculum*. I, II, S. 3 hr. PR: High-school teaching experience, or consent. Emphasizes socioeconomic and cultural influences on the curriculum; principles of curriculum development; curriculum building in the various teaching fields; techniques of experimentation and evaluation; and practice in curriculum building with special emphasis on unit construction.
307. *Curriculum Development*. I, S. 3 hr. PR: C&I 301 or C&I 304 or C&I 312 and Ed. Found. 320 or consent. Basic foundation in the concepts underlying the school curriculum in American society.
312. *Early Childhood Curriculum*. 3 hr. PR: C&I 210, 211, and consent. Issues in curriculum development for early childhood education including social, creative, cognitive, and physical goals.
314. *Early Childhood Instruction*. 3 hr. PR: C&I 210, 211, and consent. Design of instruction for individualization and development of mastery in curriculum goals for early childhood.
316. *Early Childhood Program Development and Evaluation*. 3 hr. PR: C&I 210, 211, and consent. Development and evaluation of facilities, programs, and support systems for early childhood education.
330. *Mathematics in the Elementary School*. II, S. 3 hr. PR: 20 hr. of undergraduate credit in elementary education or consent. Materials and methods of instruction for modern mathematics programs.
333. *Corrective Techniques in Mathematics Education*. I, S. 3 hr. PR: Consent. Materials and methods used in diagnosis and remediation of learning difficulties in mathematics.
334. *Mathematics in the Secondary School*. I, S. 3 hr. PR: Consent. Patterns of mathematics curriculum in the secondary school; practices in teaching mathematics; preparation, selection and use of instructional materials.
337. *Mathematics in the Junior High School*. II, 3 hr. PR: 6 hr. college mathematics or consent. Study of teaching of mathematics in the junior high school and/or middle school; application of mathematics content to teaching; instructional techniques and materials.
340. *Science in the Elementary School*. I, S. 3 hr. PR: 20 hr. of undergraduate credit in elementary education, or consent. Analysis of methods, curriculum patterns, and trends in elementary school science. Understanding and development of scientific attitudes appropriate at elementary school level.
350. *Social Studies in the Elementary School*. I, II, S. 3 hr. PR: 20 hr. of undergraduate credit in elementary education, or consent. Comprehensive consideration of objectives, content, methods, including unit procedures; materials including objects, models, exhibits, and museum items, as well as textbooks, collateral reading, maps, and graphs; means of evaluating social growth and development.

354. *Social Studies in the Secondary School*. I, S. 3 hr. PR: Consent. Nature and function of social studies in the secondary school; utilization of community, state, national, and world resources in teaching; selection of content for teaching purposes; curriculum construction with emphasis on resource and teaching units.
357. *Principles of Economic Education*. S. 3 hr. Workshop for principals, teachers, and supervisors with emphasis on the economic structure of our society and methods of integrating economics into the school program. (Sponsored jointly by College of Human Resources and Education and College of Business and Economics.)
363. *Teaching Young and Adult Farmer Classes*. I, S. 2 hr. PR: Ed. Psych. 106. Participation in conducting young and adult farmer classes and school-community food preservation centers; organization, course of study, and methods of teaching and supervision, and young farmers' association.
364. *Organizing and Directing Supervised Farming Programs*. II, S. 2 hr. PR: Consent. Planning programs of supervised farming, supervising and evaluating such programs for all-day students, young farmers, and adult farmers.
380. *Special Topics*. I, II, S. 1-6 hr. PR: Consent.
383. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
385. *Practicum. Supervision of Student Teachers*. I, II, S. PR: Consent. For persons working with or intending to work with student teachers in field experiences.
391. *Problem in Education*. I, II, S. 3 hr. Research for master's degree in education, option B.
395. *Practicum*. I, II, S. 1-12 hr. per sem. or term — aggregating not more than 12 hr. PR: 9 graduate hr. in education. Enrollment with permission of adviser or instructor in consultation. Special individual and group projects. To provide appropriate residence credits for special workshops, prolonged systematic conferences on problems and projects in education.
407. *Instructional Models of Teaching*. II. 3 hr. PR: Ed. Found. 320 or consent. Concepts and processes involved in teaching and their relationship to the development of teacher education programs.
408. *Contemporary Determinants of Curriculum*. II, S. 3 hr. PR: C&I 307 and Ed. Found. 340 or consent. Contemporary determinants of curriculum development.
409. *Curriculum Theories*. I, S. 3 hr. PR: C&I 408 or consent. Theories underlying curriculum from the past to the present and projected to the future.
438. *Survey of Major Issues in Mathematics Education*. II, S. 3 hr. PR: Consent. Individual and group research on selected topics in mathematics education.
457. *Social Studies Curriculum Development, K-12*. I. 3 hr. PR: C&I 301 or 304 and C&I 350 or 354. Stresses the application of principles and procedures pertinent to the development of social studies programs in elementary and secondary schools. Strong emphasis will be placed on the analysis of current social studies curriculum materials.
460. *Planning Programs and Courses for Vocational Agriculture Department*. I, S. 2 hr. PR: C&I 188. Gathering data, studying the farming problems of all-day students, young farmers, and adult farmers, and planning the total program for the department. (Also listed as Agr. Ed. 460.)
490. *Teaching Practicum*. I, II, S. 1-3 hr. PR: Consent. Intended for graduate students with college teaching responsibility. Provides a supervised experience in a teaching situation. (Grade as S/U.)
491. *Advance Study Project in Education*. I, II, S. 3-6 hr. Research for the program leading to the Certificate of Advanced Study in Education.

496. *Advanced Seminar*. I, II. 1 hr. PR: Consent. Opportunity for the advanced graduate student to present the student's research to faculty and/or student groups.
498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.
499. *Colloquium in Curriculum and Instruction*. I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking coursework credit, but who wish to participate in academic programs.

Education Foundations

Ed. Found.

300. *Sociology of Education*. I, II. 3 hr. An examination of education as a social institution; cultural and class influences on education; social roles and career patterns in the school system; the school and problems of the community. (Equiv. to S.A. 232.)
320. *Philosophic Systems and Education*. I, II, S. 3 hr. Educational aims, values, and criteria of education. Stresses different systems of educational philosophies, the nature of thinking applied to methods and subject matter.
340. *History of American Education*. II. 3 hr. The development of American education. Emphasis on movements and leaders.
380. *Special Problems and Workshops*. I, II, S. 1-6 hr. PR: Consent.
383. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
385. *Practicum*. I, II, S. 1-12 hr. PR: Consent.
390. *Special Topics*. I, II, S. 1-6 hr. PR: Consent.
497. *Research*. I, II, S. 1-15 hr.

Educational Psychology

Ed. Psych.

231. *Sampling Methods*. I. 3 hr. PR: An introductory course in statistics. Methods of sampling from finite and infinite populations, choice of sampling unit, sample survey design, estimation of confidence limits and optimum sample size, and single- and multi-stage sampling procedures. (Equiv. to Stat. 231.)
260. *Instruction Technology*. I, II, S. 4 hr. Individualizing mass education; application of principles of instruction to behavior changing systems including their design, production operation, and quality control; instructional facilities; evaluation of instructional systems; instructional media laboratory.
300. *Advanced Educational Psychology*. I, II, S. 3 hr. Designed for beginning graduate students. Psychological principles of learning and development as they relate to processes of classroom instruction.
311. *Statistical Methods 1*. I, II, S. 3 hr. PR: Math. 3. Basic concepts of statistical models, distributions, probability, random variables, tests of hypotheses, confidence, intervals, regressions, correlation, transformation, F and X^2 distributions, analysis of variance of one- and two-way classification models, multiple range tests, missing plots, and sample size. (Equiv. to Psych. 311 and Stat. 311.)
312. *Statistical Methods 2*. I, II, S. 3 hr. PR: Stat. 311. Extension of basic concepts of statistical models, design of experiments, multi-way classification models, factorials, split plot design, simple covariance, orthogonal comparisons, multiple linear and nonlinear regression and correlation analysis, chi-square, and non-parametric statistics. (Equiv. to Stat. 312.)

320. *Introduction to Research*. I, II, S. 3 hr. PR: Ed. Psych. 311. Methods and techniques of research in education. Major emphasis on design, analysis, interpretations, and reporting of research.
321. *Design of Experiments*. I. 3 hr. PR: Ed. Psych. 312 or equiv. Extension of basic concepts of statistics to the more complicated models and use of samples, design and analysis of experiments over time and space, fractional replications, incomplete block design, cross-over designs, lattice designs, and least squares analysis for designs with unequal sub-class numbers. (Equiv. to Stat. 321.)
330. *Advanced Educational Measurement*. I, II. 3 hr. Background for educational measurement, the nature of evaluation, measuring and predicting pupil progress. Basic statistics including measures of central tendency, percentiles, variability, and simple correlation.
333. *Nonparametric Statistics*. II. 3 hr. PR: Introductory course in statistics. Single sample tests; for related samples, two independent samples, K related samples, K independent samples, and measures of correlation. (Equiv. to Stat. 333.)
341. *Multivariate Methods 1*. I. 3 hr. PR: Stat. 311. Elementary matrix operations, partial and multiple linear and non-linear correlation and regression analyses, and introduction to discriminant analysis. (Equiv. to Stat. 341.)
342. *Multivariate Methods 2*. II. 3 hr. PR: Stat. 341 or equiv. The multivariate normal distribution, tests of hypotheses about the sample mean vectors and variance-covariance matrices from a multivariate normal distribution, and analysis of variance of multiple responses in basic statistical designs. (Equiv. to Stat. 342.)
343. *Statistical Analysis in Education*. I, II, S. 3 hr. PR: Ed. Psych. 330 or consent. Review measures of central tendency, percentiles, and correlation. Emphasis placed on correlation, regression, testing hypothesis, non-parametric tests, and other measures in analysis and inference.
350. *Principles of Behavior Modification*. I, II, S. 3 hr. Application of reinforcement theory as an instructional technique in changing human behavior. Analysis of problems in terms of behavior and the design of instruction and treatment programs to produce desired change.
360. *Instructional Systems I*. I. 3 hr. PR: Ed. Psych. 260 or consent. Delineate topic and concepts; describe target population; develop behavioral objectives; weight objectives; develop test pool; establish performance levels, produce scripts; and produce instructional materials.
361. *Instructional Systems II*. II. 3 hr. PR: Ed. Psych. 350, 360, or consent. Design of a total instructional system to teach a set of specified objectives to a specific target population of learners, including production questions, and quality control.
362. *Instructional Systems — Administration and Management*. II, S. 3 hr. PR: Ed. Psych. 361 or consent. The conduct of instructional operations within instructional systems; the administration and management of organizational arrangements to support system approaches to instruction.
363. *Communication Theory for Instruction Systems*. I. 3 hr. PR: Graduate standing. Psychological foundations of the communication process in instruction systems.
366. *Instructional Television Utilization*. I, II, S. 3 hr. PR: Advanced senior or graduate standing. Focuses upon planning for various uses of instructional television. State, local school unit, school, and classroom uses illustrated through film and studio production. Production elements for ITV programming are developed throughout television lessons and hands-on assignments.
385. *Practicum*. I, II, S. 1-12 hr. PR: Consent.
391. *Problem in Educational Psychology I*. I, II, S. 3 hr. PR: Consent.
420. *Advanced Educational Research*. I, II, S. 3 hr. PR: Stat. 311 and consent. Identification of research problems in education, consideration of alternative designs and

methods of investigations, and development of a research proposal at the advanced graduate level.

- 440. *Human Development and Behavior*. I, II, S. 3 hr. Psychological theories of human development. Contemporary theories analyzed and compared with emphasis on their implication for classroom behavior and the educational process.
- 446. *Factor Analysis*. II. 3 hr. PR: Stat. 341. Alternative methods for factor extraction, communalities, rotation in orthogonal and oblique space, and estimation of factor scores. (Equiv. to Stat. 446.)
- 450. *Psychological Foundations of Learning*. I, II, S. 3 hr. Psychological and philosophical foundations of major learning theories and their implications for instructional procedures.
- 451. *Principles of Instruction*. I, II, S. 3 hr. PR: Consent. Basic principles of teaching-learning process implied in major learning theories; study of factors in learning, variables in instructional program, and principles of instructional design.
- 481. *Special Topics*. I, II, S. 1-6 hr. PR: Consent.
- 490. *Teaching Practicum*. I, II. 1-3 hr. PR: Consent. Intended for graduate students with college teaching responsibility. Provides a supervised experience for graduate students in a teaching situation. (Graded as S/U).
- 491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced areas of educational psychology.
- 492. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
- 493. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
- 494. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
- 495. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
- 496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Designed to permit each graduate student an opportunity to present his research to the assembled faculty and graduate student body. (Graded as S/U).
- 497. *Research*. I, II, S. 1-15 hr. PR: Consent. Dissertation.
- 498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.
- 499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent. For graduate students not registered in regular coursework but who have need to use University facilities for completion of their research or program.

Health Education

Health Ed.

- 301. *Advanced School Health*. I, S. 3 hr. PR: Health Ed. 101, 20 hr. of education, graduate standing, and consent. Analysis of problems in school health services, healthful school living, nature of health education, and scope of health instruction which confronts teachers and administrators.
- 305. *Philosophy of Health Education*. I, S. 3 hr. PR: Health Ed. 2, 101, graduate standing, and consent. Analysis of the scientific bases, purposes, procedures, and content, with implications for school and public health education.
- 306. *Community Health*. II, S. 3 hr. PR: Health Ed. 2, and 305 or equiv. Health problems requiring community action, basic public health activities, community organization for health protection, voluntary health agencies, school health programs and the role of state and federal agencies in the community health program.

376. *Evaluation of Health Information*. I, S. 3 hr. PR: Health Ed. 2 and 301, or 20 hr. of education and consent. Study of published material to determine basic scientific accuracy and value.
490. *Teaching Practicum*. I and II. 1-3 hr. PR: Consent. Supervised practices in college teaching of health related learning experiences.
491. *Advanced Study*. I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
496. *Graduate Seminar*. I, II. 1 hr. PR: Consent. Graduate students will present at least one seminar to the assembled faculty and graduate student body of this program.
497. *Research*. I, II, S. 1-15 hr.
498. *Thesis*. I, II, S. 2-4 hr. PR: Consent.
499. *Graduate Colloquium*. I, II, S. 1-6 hr. PR: Consent.

Technology Education

T.E.

(The courses that follow have been designed to meet the diverse and special needs of all teachers in the technologies.)

280. *Special Problems and Workshops*. I, II, S. 1-6 hr. PR: 14 hr. in education. To take care of credits for special workshops and short intensive unit courses on methods, supervision, and other special topics. Maximum of 8 sem. hr. may be applied toward the master's degree, of which no more than 6 sem. hr. shall be in off-campus.
300. *Contemporary Problems in Transportation*. * 3 hr. Technical and social cultural problems related to man's efforts in developing and utilizing new and improved modes of transportation.
301. *Technical Developments in Transportation*. * 3 hr. PR: T.E. 300 or consent. Selected developments in transportation technology: Principles, concepts, and processes fundamental to the design and development of educational programs in the technologies.
310. *Contemporary Problems in Communication*. * 3 hr. Technical and social cultural problems related to man's efforts to develop, improve, and utilize new and improved modes of communication.
311. *Technical Developments in Communication*. * 3 hr. PR: T.E. 310 or consent. Selected developments in communications technology: identification of principles, concepts, and processes fundamental to design and development of educational programs in the technologies.
320. *Contemporary Problems in Production*. * 3 hr. Technical and social/cultural problems resulting from man's efforts to develop, improve, and utilize new and improved methods of producing goods and services.
321. *Technical Developments in Production*. * 3 hr. PR: T.E. 320 or consent. Selected developments in production technology: identification of principles, concepts, and processes fundamental to the design and development of educational programs in the technologies.
330. *Contemporary Problems in Research and Development*. S. 3 hr. Fundamental, direct, and applied research and scientific investigations in transportation, communication, and production technology; technical and social/cultural problems related to man's efforts in research and development.

Courses marked with an asterisk () are offered on a planned sequence, i.e. fall, summer, spring, summer.

350. *Industrial Arts Therapy*. I, II, S. 8 hr. Individualized instruction in industrial arts teaching techniques and therapeutic practices in rehabilitation of the handicapped.
383. *Seminar*. I, II, S. 1-6 hr. PR: Consent.
385. *Practicum*. I, II, S. 1-12 hr. PR: 8 graduate hr. in education. Enrollment with permission of adviser or instructor in consultation. Special individual and group projects. To provide appropriate residence credits for special workshops, prolonged systematic conferences on problems and projects in education.
390. *Special Topics*. I, II, S. 1-6 hr. PR: Consent.
400. *Technology: Its History and Development*. * 3 hr. The major technical periods in man's history and the interrelationships of technological developments to the social/cultural milieu.
401. *Curriculum Development and Physical Facility Design*. I, II, S. 3 hr. PR: Consent. Development of curriculum components for education in the technologies and a study of the physical facility design requirements related to curricular implementation.
402. *Development of Instructional Materials*. I, II, S. 3 hr. PR: Consent. Newer instructional media; development of media and instructional units for education in the technologies.
403. *Design in Technology*. S. 3 hr. Emphasis on application of design components in technology education.
404. *Readings in Technology and Culture*. * 3 hr. The fundamental, historical, and contemporary ideas of the nature of technology as an area of man's created knowledge.
405. *Innovation and Invention*. * 3 hr. The historic and current importance of man's innovative thought in his developing technology.
480. *Projects in Technology Education*. I, II, S. 1-6 hr. PR: Consent.
481. *Problems in Technology Education*. I, II, S. 1-6 hr. PR: Consent.
490. *Teaching Practicum*. I, II, S. 3-12 hr. PR: Consent.
491. *Advanced Study*. I, II, S. 2-4 hr. PR: Consent.
496. *Graduate Seminar*. I, II, S. 2-4 hr. PR: Consent.
497. *Research*. I, II, S. 1-15 hr.
498. *Thesis*. I, II, S. 1-15 hr.
499. *Colloquium*. I, II, S. 2-9 hr. PR: Consent.

Reading

Graduate students with successful teaching experience at the elementary, secondary, or college levels, or those who desire to enter these fields, may wish to increase their competence as teachers of reading, to keep informed of latest trends and developments, or to advance to positions of greater responsibility. The Department of Reading offers graduate programs leading to a Master of Arts degree in reading, a post-master Certificate of Advanced Study, and the Doctor of Education degree with a major in reading. Completion of these advanced programs may lead to certification as reading specialists or reading supervisor.

Course offerings provide opportunities to become familiar with the organization, implementation, and administration of developmental and remedial reading programs for students at the elementary, secondary, and college levels. Advanced students of superior academic and professional background have opportunities to participate in clinical work, to become involved in research,

and to prepare for positions in public and private schools at elementary, secondary, and college levels, as well as related positions in industry and business.

Programs of graduate study are worked out individually with each student. Course requirements depend upon previous academic background and experience and the position for which the student wishes to prepare.

Practical training for teachers and specialists-in-training is provided by the Reading Clinic in Allen Hall. The University Reading Laboratory is a service for WVU undergraduates who seek help with reading and study skills. This program provides opportunities for experience in college-adult reading for the graduate students in reading who — as teaching assistants — are part of the University Reading Laboratory staff. Practicum experiences may sometimes be available for other graduate students interested in this area.

Certification in Reading

Two licenses for teaching reading are available to West Virginia teachers: a temporary endorsement and an endorsement as a Reading Specialist. (Students who desire reading certification in states other than West Virginia should consult with their adviser relative to requirements.)

Temporary Endorsement. Twelve semester hours of graduate credit in reading courses are needed for temporary endorsement as a reading teacher. The areas of concentration and approved courses are:

- I. Foundations of Reading Instruction (3 hr.): Rdng. 321 — Reading for Classroom Teachers; Rdng. 322 — Reading Instruction in Secondary Schools; or Rdng. 324 — Psychological Foundations of Reading Instruction.
- II. Diagnosis and Correction of Reading Difficulties (3 hr.): Rdng. 283 — Workshop: Remedial Reading; Rdng. 340 — Diagnostic and Prescriptive Reading Instruction; or Rdng. 341 — Classroom Strategies in Diagnosis and Prescription.
- III. Clinical Reading (3 hr.): Rdng. 343 — Problems in Clinical Reading; or Rdng. 444 — Advanced Clinical Reading.
- IV. Planning and Organizing Reading Programs (3 hr.): Rdng. 326 — The Organization, Administration, and Supervision of the Reading Program.

Reading Specialist Endorsement. Thirty semester hours of graduate credit are needed for a Reading Specialist endorsement — 21 semester hours with credit in each area named in Group A, and 9 semester hours with credit in each area named in Group B. The areas of concentration and approved courses:

I. Course Requirements

Group A (21 semester hours)

Foundations of Reading Instruction (9 hr.)

Rdng. 321 — Reading for Classroom Teachers

Rdng. 322 — Reading Instruction in Secondary Schools

Rdng. 324 — Psychological Foundations of Reading Instruction

Diagnosis and Correction of Reading Difficulties (6 hr.)

Rdng. 283 — Workshop: Remedial Reading

Rdng. 340 — Diagnostic and Prescriptive Reading Instruction

Rdng. 341 — Classroom Strategies in Diagnosis and Prescription

- Rdng. 442 — Diagnosis of Reading Difficulties
- Rdng. 443 — Correction of Reading Difficulties
- Clinical Reading (Laboratory Experiences) (3 hr.)
- Rdng. 343 — Problems in Clinical Reading
- Rdng. 444 — Advanced Clinical Reading
- Planning and Organizing a Reading Program (3 hr.)
- Rdng. 326 — Org., Adm., & Supv. of Rdng. Prgrm.

Group B (9 semester hours)

- Measurement and/or Evaluation (3 hr.)
 - Ed. Psych. 330 — Advanced Educational Measurements
 - Rdng. 480 — Seminar: Measurement and Eval. in Language Arts
- Psychology of Exceptionality (3 hr.)
 - Sp. Ed. 250 — Survey of Exceptional Children and Adults
 - Psych. 282 — Exceptional Children
- Psychology of Learning and/or Personality (3 hr.)
 - Psych. 263 — Introduction to Personality
 - Psych. 264 — Psychology of Adjustment
 - Psych. 281 — Abnormal Psychology
 - Psych. 423 — Human Learning
 - Ed. Psych. 300 — Advanced Educational Psychology
 - Ed. Psych. 450 — Psychological Foundations of Learning
 - Ed. Psych. 451 — Principles of Instruction

II. Additional Requirements

- A. A valid professional teaching certificate or its equivalent
- B. Three years of successful experience as a classroom teacher
- C. A master's degree in reading or classroom teaching
- D. Recommendation of the College for a Reading Specialist Certification

Master of Arts Degree (Reading)

I. Admission to Program

- A. Accepted to graduate study by the WVU Office of Admissions and Records.
- B. Minimum 2.5 undergraduate grade-point average.
- C. Applicants who do not meet the above criteria may be given probationary admission.
- D. Students must complete 6 or more hours in reading within two years after admission (probationary or regular) or admission will be invalidated and the student will be required to reapply.

II. Program Requirements

- A. Program A — Completion of a minimum of 36 hours including the completion of a problem or thesis.
- B. Program B — Completion of a minimum of 36 hours.
- C. Credit Limitations
 - 1. No more than 12 hours of graduate credit obtained at other approved institutions may be considered for transfer.
 - 2. Written approval from the adviser before enrollment is necessary before transfer credit can be counted.
- D. A minimum grade-point average of 3.0 is required for graduation.

- E. Successful completion of a written examination or a non-credit Master's Seminar.

III. Course Requirements

(The course requirements in Program A and B lead to Reading Specialist Certification.)
(Electives should be decided in conference with adviser.)

A. Required Courses	Program	A	B
Rdng. 321.....		3	3
Rdng. 322.....		3	3
Rdng. 324.....		3	3
Rdng. 326.....		3	3
Rdng. 340.....		3	3
Rdng. 341.....		3	3
Rdng. 342.....		3	3
C&I 307.....		0	3
Ed. Psych. 330 or Rdng. 480.....		3	3
Ed. Psych. 300 or 450 or 451 or Psych. 263 or 264 or 281.....		3	3
Sp. Ed. 250 or Psych. 282.....		3	3
Rdng. 495.....		6	0
		<hr/>	<hr/>
		36	33
B. Electives.....		0	3
		<hr/>	<hr/>
Total		36	36

Certificate of Advanced Study in Reading

The program for the Certificate of Advanced Study in Reading is designed to help individuals who develop advanced knowledge and professional skill in the language arts area and prepare them to assume leadership positions in educational systems.

I. General Requirements

- A. Complete the general requirements for admission to the WVU Graduate School.
- B. Present at the time of application, proof of a master's degree from an accredited university.
- C. Have a minimum grade-point average of 3.0 on all work completed for the master's degree.
- D. Verify the completion of a minimum of three years of teaching or related experiences.
- E. Plan, with the aid of a CAS committee, a total program of 30 graduate credits, including a 6-hour research project.
- F. Complete a residency requirement of 24 semester hours.
- G. Meet all requirements for a Reading Specialist Certificate.
- H. Maintain an average of 3.0 or above on all coursework.
- I. Pass an oral examination on the research project and on all courses taken in Reading.
- J. Meet all the above requirements within the *seven* calendar years immediately preceding the award of the Certificate of Advanced Study.

II. Course Requirements (30 hours)	Hr.
A. Reading (selected from the following)	15
Rdng. 325 — Survey of Major Problems in Reading	3
Rdng. 332 — Survey of Major Problems in the Language Arts	3
Rdng. 442 — Diagnosis of Reading Difficulties	3
Rdng. 443 — Correction of Reading Difficulties	3
Rdng. 444 — Advanced Clinical Reading	3
Rdng. 480 — Seminar	3
Rdng. 481 — Special Topics	1-6
Rdng. 485 — Practicum	1-12
Rdng. 497 — Research (6 hours required)	1-15
B. Electives (reading or related courses)	9
Selected by adviser and student to meet individual needs and certification requirements.	

Reading majors at the CAS level who have not completed prerequisites for the courses selected should plan to do so as additional academic requirements for the degree unless the courses are waived. Prerequisites may be waived by consent of the adviser and Reading Center faculty if in their opinion the student has had background experiences in reading which are equivalent to those provided by the courses listed in this *Catalog* as prerequisites.

Doctor of Education (Reading)

Doctoral study in reading is highly individualized. As such, the reading curriculum for a concentration at the doctoral level cannot be prepared in advance. Courses will depend upon the student's background, experience, courses completed at the master's level, and the post-doctoral objectives of the individual. Reading courses to be completed at another institution must receive prior approval by the student's doctoral committee.

Students who desire to complete the Doctor of Education degree with a concentration in reading must meet the following standards:

I. Admission Requirements

- A. Complete all Graduate School and College requirements for admission to graduate study at the doctoral level.
- B. Show evidence of a minimum graduate grade-point average of 3.2 or higher on a 4-point scale. Consideration will be given to students who are below a 3.2 cumulative graduate grade-point average only after (1) an oral interview with the Reading Center faculty, (2) completion of a minimum of 9 hours of residence credit in reading, and (3) review of recommendations and all other criteria pertinent to admission.
- C. Provide the Reading Center with the following:
 1. GRE or MAT scores.
 2. Transcripts of all college work.
 3. Three or more letters of recommendation.
 4. Evidence of teaching or other acceptable experiences.
 5. A vita which shows practical work experiences.
- D. Complete at least nine hours of post-master's courses in reading, all to be taken at WVU, before an oral interview.

- E. Successfully complete an oral interview with the Reading Center faculty-student committee.

II. Completion Requirements

After the doctoral student has successfully completed all of the above admission requirements, the following steps should be taken in cooperation with the student's adviser.

- A. Plan with the adviser the selection of a doctoral committee.
- B. Meet with the doctoral committee to complete plan of study.
- C. Plan, with the aid of the doctoral committee (1) a satisfactory course of study with a minimum of 24 semester hours in reading, (2) a minor area of concentration, and (3) selected courses in foundations of education.

III. Admission to Candidacy and Graduation Requirements

- A. Pass the Admission to Candidacy Examination satisfactorily.
- B. Prepare a suitable dissertation, with committee approval, on some phase of reading or language arts.
- C. Pass the final oral examination successfully.
- D. Present suitable printed copies of the dissertation to the Chairperson of the Doctoral Committee, the Reading Department, the Graduate School, and to other University agencies which might require copies.

Reading

Rdng.

- 221. *Developmental Reading*. I. 3 hr. PR: Consent. Fundamentals of reading instruction. Emphasizes classroom organization and teaching techniques.
- 240. *Corrective Reading Techniques*. II. 3 hr. PR: Consent. Fundamentals of informal reading diagnosis and corrective classroom reading instruction. A practicum for the utilization of informal diagnosis and correction techniques is provided.
- 283. *Special Workshop in Reading*. I, II, S. 1-6 hr. For elementary and secondary students in preservice education programs, as well as for elementary and secondary teachers in inservice education.
- 321. *Reading for Classroom Teachers*. I, II, S. 3 hr. Teaching reading, grades 1-12. Gives students who have little or no background in reading an opportunity to study the reading process and to learn how to apply effective techniques and methods.
- 322. *Reading Instruction in the Secondary Schools*. II, S. 3 hr. The reading skills essential at the high school level and how they may be developed in the various subject-matter areas.
- 324. *Psychological Foundations of Reading Instruction*. I, S. 3 hr. Physiological, psychological, and sociological factors underlying the development of reading skills. For majors in education, reading, guidance, special education, speech communication, and other areas whose specialties require an understanding of the reading process.
- 325. *Survey of Major Problems in Reading*. II, S. 3 hr. PR: Rdng. 321 or 322 and 324. A research course in which each student will complete an individual problem in an area of special interest.
- 326. *The Organization, Administration, and Supervision of the Reading Program*. I, II, S. 3 hr. PR: Rdng. 321, 324, and 340. Practices and procedures in organizing reading programs in all types of schools, grade 1 through college.
- 330. *Teaching the Language Arts*. I, S. 3 hr. The interrelationship of the different phases of the language arts. Special attention to organizing the language arts program,

selecting materials and equipment, and understanding effective techniques and methods for teaching listening, oral language, written language, handwriting, and spelling.

331. *Selection and Evaluation of Reading Materials*. I, S. 3 hr. PR: Rdng. 321. Survey of critical reading skills, techniques, and procedures with emphasis on the selection of supplementary materials needed for effective developmental and remedial reading programs.
332. *Survey of Major Problems in the Language Arts*. II, S. 3 hr. PR: Rdng. 330 or consent. An advanced course covering major problems of the teacher or supervisor of language arts instruction. A research course in which the student completes an individual problem.
340. *Corrective Techniques in Reading Instruction*. I, II, S. 3 hr. PR: Rdng. 321 or 322 and 324. Basic course designed to develop theoretical concepts in the diagnosis and prescription of language problems. Emphasis on techniques utilized by classroom and special teachers of reading and language arts.
341. *Classroom Strategies in Diagnosis and Prescription*. I, II, S. 3 hr. PR: Rdng. 340. A practicum designed to implement theoretical concepts of diagnosis and prescription.
342. *Reading Diagnosis and Prescription in Learning Disabilities*. II, S. 3 hr. PR: Consent. Basic course in diagnostic and prescriptive reading techniques and procedures for learning disability majors. Special emphasis on practicum experiences in administering and interpreting reading tests, as well as prescribing and administering remediation suggestions.
343. *Problems in Clinical Reading*. I, II, S. 3 hr. PR: Rdng. 340 and 341. Laboratory course in remedial reading. Major emphasis on tutoring remedial cases in the Reading Center.
380. *Seminar*. I, S. 1-6 hr. PR: Consent. Seminar for master's degree students stressing special topics concerned with the education and sociological and psychological aspects of language arts instruction.
381. *Special Topics*. I, II, S. 1-6 hr. PR: Consent. Special topics or research in reading and language arts for master's degree students in reading.
385. *Practicum*. I, II, S. 1-12 hr. PR: Consent. Practicum type course for master's degree students in which internship, advanced student teaching, and reading administration and supervision practicum experiences can be pursued.
442. *Diagnosis of Reading Difficulties*. I, S. 3 hr. PR: Rdng. 340. Advanced instruction in diagnosis. Emphasis on use of standardization tests, informal tests, machines, and observation in determining reading difficulties.
443. *Correction of Reading Difficulties*. II, S. 3 hr. PR: Rdng. 442 or consent. Advanced instruction in correcting reading difficulties. Emphasis on methods of teaching, use of machines and commercial materials, constructing and using teacher-made exercises, and evaluating progress.
444. *Advanced Clinical Reading*. I, II, S. 3 hr. PR: Rdng. 341. Laboratory course in remedial reading. Emphasis on diagnosis and treatment of reading difficulties.
480. *Seminar*. I, II, S. 1-6 hr. PR: Consent. The interrelationships among the language arts; mental, physical, and psychological deterrents to language development; needed research in language arts; and similar topics.
481. *Special Topics*. I, II, S. 1-6 hr. PR: Admission to doctoral program in reading and consent. Advanced seminar. Weaknesses and strengths in current reading programs, needed research in reading, and suggestions for improving reading instruction at elementary, secondary, and college levels.

485. *Practicum*. I, II, S. 1-12 hr. PR: Consent. Practical application of reading theory to organizing and conducting developmental and remedial reading programs.
495. *Problem in Reading*. I, II, S. 3 hr. Research for master's degree in reading.
497. *Research*. I, II, S. 1-15 hr. Research for doctoral degree in reading.

Family Resources

Family Resources offers work leading to the degree of Master of Science.

All candidates for the graduate degree must conform to the general regulations of the Graduate School and Family Resources.

After applying to the Graduate School, applications will be reviewed by a Graduate Admissions Committee of the division. At that time the applicant will be notified by the Chairman of the Graduate Admissions Committee of acceptance to pursue graduate study toward candidacy for the Master of Science degree, according to the four types of admission described in this *Catalog* degree program with the following exception. A student who does not have an overall undergraduate grade-point average of 2.75 may be admitted in the *special provisional* category. Reclassification will be considered upon completion of 12 hours of coursework in Family Resources with a grade-point average of 3.0. Additional information may be obtained by writing the Chairman of Family Resources.

The graduate program is designed to offer students opportunity to work in a variety of different specializations, as well as the opportunity to take graduate level coursework in supporting disciplines.

The following Masters of Science programs are offered:

(1) Home Economics Education — A dual program is offered enabling the student to be granted a vocational certificate with the master's degree. An applicant must have graduated from an accredited institution with an earned teaching certificate. Teaching and/or work experience is strongly recommended.

(2) Child Development/Family Relations — The particular weighting of the two areas in this program will be determined by the student's interest and need. An undergraduate major in family resources, psychology, or sociology/anthropology is recommended.

(3) Human Nutrition — The program in human nutrition has two emphases: clinical dietary counseling and nutrition education. American Dietetics Association membership requirements must be met for the clinical dietary counseling emphasis.

(4) Homemaker Rehabilitation — A program to prepare home economists for working with the disabled. A practicum and an internship are included in the curriculum. A bachelor's degree in home economics is required of all applicants.

To enter as a degree candidate in the graduate program, an applicant must have a bachelor's degree from an accredited institution and sufficient background in the area of specialization to qualify for admission to graduate courses in that area. Students with inadequate backgrounds will be required to take additional coursework which will not apply to the master's program.

Each graduate student will be assigned an adviser. A graduate guidance committee will be selected by the student and the adviser. This committee shall consist of a minimum of three members, at least two of whom must be members of the graduate faculty of the University and the faculty of Family Resources.

A student will select either: (A) the thesis, or (B) the coursework program:

(A) A student pursuing the thesis program will take a minimum of 24 semester hours of coursework plus 6 semester hours of credit for the thesis. After the student has completed 12 hours of on-campus course work, the program guidance committee will review the coursework for academic performance with reference to admission to candidacy for the Master of Science degree. The graduate guidance committee will be consulted by the student selecting a thesis topic and in completing the thesis requirement. Approval of the thesis, following an oral examination by the graduate guidance committee of the student, will be required before the degree is granted.

(B) The student completing the coursework option will take a minimum of 36 semester hours of credit, approved by the graduate guidance committee. After the student has completed 12 hours of on-campus work, the guidance committee will review the coursework for academic performance with reference to admission to candidacy for the Master of Science degree. Near the end of graduate study, the student shall be required to take a written comprehensive examination which shall be prepared, evaluated, and approved by the committee.

Approval in writing must be secured in advance from the student's committee to elect graduate courses offered at other institutions or off-campus.

Where written consent is required it may be given only by the instructor in the course or the Chairman of Family Resources.

Home Economics Education

H.E. Ed.

- 278. *Vocational Home Economics*. 3 hr. PR: Senior standing or consent. Develops an understanding of federal vocational legislation to enable an individual develop program proposals and implement programs in vocational education.
- 311. *Home Economics Curriculum*. 3 hr. PR: Experience in teaching home economics or consent. Theory and research in home economics curriculum. Change in existing programs and development of new programs.
- 312. *Supervision in Home Economics*. 3 hr. PR: Teaching experience and consent. For home economics teachers preparing to serve as supervising teachers in off-campus training centers.
- 313. *Evaluation in Home Economics*. 3 hr. PR: 30 hr. of family resources, 7 hr. of education or consent. Experience in devising, selecting, and using a variety of techniques for evaluating progress toward cognitive, affective, and psychomotor objectives in home economics.
- 314. *Adult Education*. 3 hr. PR: Consent. Psychology of adult learning, philosophy, types of programs to include organization, methods and techniques, and leadership training in working with adult groups.
- 395. *Practicum: Supervision of Student Teachers*. 1-12 hr. PR: Degree and teaching certificate in home economics or consent.

Textiles and Clothing

TC

- 224. *Flat Pattern Design*. I, II. 3 hr. PR: TC 22, 27, 123 or consent. Opportunity for creative expression and for understanding of pattern design through flat pattern. Costumes designed and constructed by the student. (Lab fee \$5.00.)

225. *Tailoring*. I, II. 3 hr. PR: TC 22, 27, 224. Tailoring suits and coats. Emphasis on professional techniques, advanced fitting, and construction of garments. (Lab fee \$5.00.)
227. *Advanced Textiles*. I, II. 3 hr. PR: TC 27, 127. Comparative characteristics of all textile fibers are presented. Physical and chemical properties are explained with reference to fiber morphology and/or manufacturing processes.
382. *Special Topics in Clothing or Textiles*. I, II, S. 1-4 hr. per sem. PR: Written consent.

Housing and Design

HD

233. *Decorative Arts I*. I. 3 hr. PR: 9 hr. HD courses. The decorative arts — antiquity to American periods.
234. *Decorative Arts II*. II. 3 hr. PR: HD 233. The decorative arts — American periods to present.
383. *Special Topics in Housing and Design*. I, II, S. 1-4 hr. per sem. PR: Written consent.

Child Development; Family Relations

CDFR

244. *Family and Individual in the Community*. I, S. 3 hr. PR: One course in the family, or sociology/anthropology, or consent. Social psychological analysis of the individual in the family and in other social systems. Study of role relationships, community processes, and attitudes and values as they affect the behavior of individual.
245. *Family Development*. II, S. 3 hr. PR: CDFR 144 or consent. Family development in cross-cultural and historical perspectives. The contemporary family with special attention to social class differences and use of life cycle and developmental task concepts as analytic tools.
246. *Adolescent Development*. II. 3 hr. PR: CDFR 141, 142. Adolescent in contemporary American culture, including normative physical, social, and personality development; relationships within various typical social settings (e.g., family, school, community, peer group).
284. *Special Topics in Child Development*. I, S. 1-4 hr. per sem. PR: Written consent.
288. *Special Topics in Family Relations*. II, S. 1-4 hr. per sem. PR: Written consent.
341. *Cognitive Development of the Child*. I, S. 3 hr. PR: CDFR 141 and 142 or consent. Piaget's basic theory, including his view of perceptual, symbolic, motor and logico-mathematical development, across the life span. (Offered alternate odd years in Summer.)
345. *Socio-Emotional Development of the Child*. II, S. 3 hr. PR: CDFR 141 and 142 or consent. A study and examination of contemporary theory and research into various facets of the socialization process in infancy and childhood. (Offered alternate even years in Summer.)
347. *Comparative Study of the Family*. 3 hr. PR: CDFR 144 or consent. The comparative method as a framework for family analysis. The family as both an independent and dependent variable in social change. Alternative methods for achieving similar cultural objectives. Converging patterns in the contemporary world setting.
348. *Theories of Child Development*. S. 3 hr. PR: CDFR 141 or consent. An examination of the major theoretical conceptions of child development. The work of Werner, Piaget, Freud, Erikson, and the American learning theorists will be compared and contrasted.

384. *Special Topics in Child Development*. II, S. 1-4 hr. per sem. PR: Written consent.
388. *Special Topics in Family Relations*. I, S. 1-4 hr. sem. PR: Written consent.

Foods; Institution Administration

FIA

255. *Experimental Foods*. II. 3 hr. PR: FIA 55, Chem. 131, or consent. Factors involved in food processing under various conditions. (Lab fee \$10.00.)
258. *Laboratory Practice in Institution Management*. I, II. 3 hr. PR: FIA 158 and consent. Experience under supervision in planning, preparing, and serving food in an institution. Selection of place and type of experience determined by needs of students.

Home Management; Family Economics

HMFE

261. *Consumer Economics*. II. 3 hr. PR: Econ. 51 or HMFE 161, or consent. Understanding the consumer's role in our economy. Study of research methods and techniques used to identify, understand, and solve consumer problems.
262. *Introduction to Homemaker Rehabilitation*. I. 3 hr. PR: Consent. A comprehensive coverage of the historical development, philosophy, legislation, community resources, research and professional literature provides a base of knowledge needed by the student to enter the field of homemaker rehabilitation.
363. *Community Resources for Disabled Homemakers*. I. 3 hr. Provides students with knowledge and skills needed to utilize other disciplines in the team approach to rehabilitating handicapped homemakers. Presentations by team members, such as physicians, nurses, counselors, therapists, social workers. etc.
364. *Home Management for Disabled Homemakers*. II. 3 hr. PR: HMFE 262 or consent. Provides students with skills to teach home management concepts related to the disabled homemaker in performance of household tasks. Emphasis on work simplification, body mechanics, equipment selection, and adaptation to promote independent living.
365. *Homemaker Rehabilitation Practicum*. I, II, S. 6 hr. PR: HMFE 363, 364; Rehab. Counsel. 300, 310, 312. Field experience under supervision designed to develop student's knowledge and skills needed for working in homemaker rehabilitation. A variety of settings, including 6 weeks of resident experience to allow working directly with clients.

Nutrition

NTR

271. *Human Nutrition*. I. 3 hr. PR: NTR 71, biochemistry, physiology. Role of food nutrients in physiological and biochemical processes of the body; nutritional needs of healthy individuals under ordinary conditions and in periods of physiologic stress.
273. *Community Nutrition*. II. 3 hr. PR: Consent. Nutritional health of individuals and groups, nutritional status assessment, dietary counseling, as well as the role played by agencies, organizations, and professional groups interested in nutrition.
274. *Diet Therapy*. II. 3 hr. PR: NTR 271; Biol. 266. Adaptations of normal diet for diseases whose prevention or treatment is largely influenced by diet.

Family Resources — Seminars

- 282. *Seminar in Clothing or Textiles.* I, II, S. 1-4 hr. per sem., max., 9 hr. PR: Written consent. Significant contemporary issues in clothing or textiles.
- 283. *Seminar in Housing or Design.* I, II, S. 1-4 hr. per sem.; max. 9 hr. PR: Written consent; 12 hr. HD courses. Significant contemporary issues in housing or design.
- 285. *Seminar in Foods and/or Institution Administration.* I, II, S. 1-4 hr. per sem.; max. 9 hr. PR: Written consent. Significant contemporary issues in foods and/or institution administration.
- 286. *Seminar in Home Management or Family Economics.* I, II, S. 1-4 hr. per sem.; max. 9 hr. PR: Written consent. Significant contemporary issues in home management or family economics.
- 287. *Seminar in Nutrition.* I, II, S. 1-4 hr. per sem.; max. 9 hr. PR: Written consent. Significant contemporary issues in nutrition.
- 381. *Seminar in Home Economics Education.* I, II, S. 1-4 hr.; max. 9 hr. PR: Senior standing and written consent. Home economics education at secondary, college, and adult levels. Current research and trends in selected areas.
- 387. *Graduate Seminar in Nutrition.* I, II, S. 1-4 hr. per sem.; max. 9 hr. PR: Written consent. Review and discussion of recent progress in foods and/or nutrition research.

Family Resources — Research

- 390. *Research Methods in Family Resources.* I, II. 3 hr. PR: Introductory statistics or written consent. Research methodology, experimental design, and statistical analysis as relevant to problems in home economics. Required for all master's candidates in the Division.
- 391. *Assigned Topics.* I, II, S. 1-6 hr. per sem.; max. 9 hr. Required of all students writing theses.
- 490. *Teaching Practicum.* I, II. 1-3 hr. PR: Consent. Supervised practices in college teaching of home economics.
- 491. *Advanced Study.* I, II, S. 1-6 hr. PR: Consent. Investigation in advanced subjects which are not covered in regularly scheduled courses. Study may be independent or through specially scheduled lectures.
- 492. *Specialized Seminar in Home Economics Education.* S. 1-3 hr. PR: Consent.
- 493. *Specialized Seminar in Child Development and Family Relations.* S. 1-3 hr. PR: Consent.
- 494. *Specialized Seminar in Nutrition.* S. 1-3 hr. PR: Consent.
- 495. *Specialized Seminar in Rehabilitation.* S. 1-3 hr. PR: Consent.
- 496. *Graduate Seminar.* I, II. 1 hr. PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of the student's program.
- 497. *Research.* I, II, S. 1-15 hr.
- 498. *Thesis.* I, II, S. 1-6 hr. PR: Consent.
- 499. *Graduate Colloquium.* I, II, S. 1-6 hr. PR: Consent. For graduate students not seeking coursework credit but who wish to meet residence requirements, use the University's facilities, and participate in its academic and cultural programs.



Built in 1870, Martin Hall houses the School of Journalism.

School of Journalism

The School of Journalism awards the degree of Master of Science in Journalism. The graduate program is for the student or professional journalist — the mass communicator — dedicated to learn to meet the complex needs of society today, to become a more competent journalist and a capable manager, or to become a teacher — to prepare for a career rather than for a first job. The student will improve ability to evaluate research findings and to draw on experts for knowledge valuable to the public.

Improving oneself as a writer is required. Student initiative in investigation and learning is essential.

An individualized program of study is custom-designed with each student according to personal goals and needs. Thus it is possible to emphasize advertising, broadcasting, news-editorial, or public relations, including the new public relations option: "Development: fund-raising, alumni relations, foundation management." Or one may prefer a general program.

To be the better journalist that society needs today, the graduate student must identify, understand, and explain to the public the issues of social concern. To do this, it is necessary to study human behavior: psychology, social psychology, sociology/anthropology. Distinguished by flexibility, the graduate program allows the journalist to minor in behavioral studies or in other appropriate disciplines, or to study a double minor. The study of statistics and the computer is available as a minor.

Women constitute a high proportion of our graduate enrollment.

Two major avenues to the Master of Science in Journalism are the Thesis Program and the Professional Program. More alike than different, both call for study of general psychology, social psychology, and sociology/anthropology. The Thesis Program requires two courses not required in the Professional Program: "Seminar in Communications Theory" and "Research Methods and Literature."

Both programs are career oriented, affording a broad range of topics for the thesis or professional project. Identical topics might conceivably be investigated in either program, the thesis offering opportunity to employ scientific methods of research and to draw heavily on the behavioral sciences. Both programs require that the final report topic be one of academic and professional value beyond the routine work of the practicing journalist. In both cases, the degree candidate is encouraged to do investigations that will provide advancement toward career goals in journalism.

In either program, one has the opportunity for investigative reporting in depth, of designing a professional program (as in public relations, advertising, or development), or producing projects that can be applied in professional practice. The thesis is expected to draw more heavily on theory and scientific research findings or on the historical method, and may be an analytic-synthetic study. Variety and flexibility in relation to the candidate's goals mark both avenues to the degree.

A new career option in public relations is Journ. 312, Fund-Raising and Foundation Management. (It also includes alumni relations.) This program can lead to careers in colleges and universities, with opportunities for advancement in the broad field of the management of educational resources.

"Experience Program" and Financial Aid. Believing that academic study and application together make for effective learning, our "Experience Program" seeks opportunity for the student to perform professional work in journalism.

Highly qualified students may compete for two excellent opportunities, among other possible openings:

1. *Graduate Teaching Assistants* help with instruction in advertising, broadcasting, news writing, editing, and public relations.

2. *Graduate Interns* provide professional journalism services (primarily public relations and promotion) to nonjournalism departments of the University.

Both opportunities provide stipends of \$2,151 and up for the 9 months, requiring 15 hours of work per week. Tuition is waived for the two semesters and the following summer.

Additional internships are to be found — paying and nonpaying. Well-prepared graduate students have enjoyed excellent opportunities for professional internships with, for example, the New York public relations firm — The Alexander Co., The Greenbrier resort hotel in West Virginia, the University, and local media.

Our job placement record is excellent. We support your job search. Our alumni newsletter, *Fourth Estatesman*, announces your desire for internships while in the program and your availability for jobs upon graduation. We receive notice of job vacancies.

Students working 15 hours a week in assistantships, internships, or other jobs may require *up to 24 months* in the program. This includes time to do a worthwhile thesis or project.

Admission

Following are the requirements for admission to graduate study in the School of Journalism:

1. Hold a bachelor degree in journalism from an accredited institution, *or*
2. Hold a bachelor degree in another field from an accredited institution and meet the following requirements:

- (a) Must have completed a core of journalism courses, with subjects and grades acceptable to the School of Journalism, *or*

- (b) Must complete undergraduate journalism and other courses to be prescribed by the School of Journalism, *or*

- (c) Must demonstrate knowledge and competence in a number of journalism topics to be prescribed by the School of Journalism, *or*

- (d) Must meet a combination of the foregoing requirements.

3. Must have a cumulative grade-point average of at least 2.5 in undergraduate study, with grade-point average of 3.0 in journalism courses completed — undergraduate and graduate.

4. Must have accomplished some introductory study of human behavior, such as psychology, social psychology, sociology/anthropology, or may be allowed to make up such preparatory study when so prescribed by the School of Journalism. It is desirable to have studied philosophy of science, ethics, and research methods.

5. Must provide letters testifying to academic potential and, where appropriate, to professional development.

6. Must submit samples of writing that exhibit knowledge of English fundamentals: grammar, punctuation, syntax, spelling.

Qualified applicants *from a variety of undergraduate major fields* are admitted. Other applicants may have undergraduate records that do not quite meet the requirements of the School of Journalism. Those two categories of applicants will be considered for the opportunity to qualify by a minimum of under-

graduate study as preparation to gain the most from the graduate study experience. The applicant's letters of recommendation and personal writing should provide evidence of maturity and strong motivation for educating himself in preparation for a journalism career. Professional experience will be reviewed.

Foreign Students. Believing that mutual benefit is derived when students from other countries study in the WVU School of Journalism, the School welcomes foreign students. At the same time, the School recognizes that journalism, more than many other fields, requires language skill. To profit by journalism study and practice in the English language environment, foreign students must have a ready understanding of the American language idiom. They will be called on to follow rapid speech in interviews, press conferences, public addresses, and in the classroom, as well as to deal with abstract ideas communicated in English. Award of the master's degree in journalism attests to the student's facility in English. Moreover, in graduate study, foreign students must maintain the same grade-point average (3.0) required of other students.

Therefore, recognizing the language difficulty, and desiring to aid in preparing for graduate study in a new environment, the School of Journalism offers foreign students a *transition semester*. Unless students obviously are fluent in English speech and pass a test in which they demonstrate comprehensive knowledge of English fundamentals (grammar, punctuation, syntax, spelling), they will be offered a semester of undergraduate study (*not* for graduate credit), which will enable them to sharpen language skills. Such a transitional semester also will permit foreign students to study selected courses in preparation for graduate study. These courses will help them adapt to the American system of journalism and to the new cultural environment.

Master of Science in Journalism

For the master's degree in journalism, the student must meet the following requirements:

Thesis Research Program. A minimum of 30 semester hours of acceptable graduate credit, *including* a thesis for a maximum of 6 hours of credit.

a. As part of the 30 hours, a minimum of 18 hours, including the thesis, in School of Journalism courses.

b. Included in the 30 hours, a minimum of 9 hours in a minor conducted outside the School of Journalism.

Professional Program. A minimum of 36 semester hours of acceptable graduate credit, *including* a professional project for a maximum of 6 hours of credit.

a. As part of the 36 hours, a minimum of 18 hours, including the professional project, in School of Journalism courses.

b. Included in the 36 hours, a minimum of 9 hours in a minor conducted outside the School of Journalism.

In either program, the candidate is allowed to take more than the minimum required number of hours.

Upper-Level Courses Required. In both programs, 60 percent of the graduate credits submitted for the degree must be in courses numbered 300 or above.

Grades. Coursework must be completed with a minimum grade-point average of 3.0. The thesis and professional project will be graded as S or U.

Examination. The candidate for the master's degree will pass an oral examination on his thesis or professional project and in his major and minor fields. In addition, his thesis or professional project will be evaluated as a *test of the candidate's writing skill*.

Journalism

Journ.

203. *Media Management and Promotion*. I, II, S. 3 hr. PR: Journ. 113 and 115. Problems, functions, and responsibilities in communications media organization, operation, management, and promotion. Special emphasis on case study of media management and promotion in the Appalachian area.
204. *Advertising Markets and Media*. I, II, S. 3 hr. PR: Journ. 113. Advertising planning, buying, and scheduling by advertisers, media, and advertising agencies on national and local levels. Seminar discussions and assignments; special emphasis on problems related to Appalachian markets and media.
210. *Advertising Production*. II. 3 hr. PR: Journ. 110. Techniques and mechanics of producing print advertising. Art, typography, printing processes, layout, make-up, and scheduling. Student must acquire tools and supplies for lab work; cost: about \$10.00.
220. *Writing for Magazines*. I, II. 3 hr. PR: Upper-division or graduate standing; Journ. 18 or equiv. preparation in grammar, punctuation, and spelling. Professional approach: magazine analysis, query letters, writing, rewriting; submitting manuscripts for publication.
221. *Public Relations Interning*. I, II. PR: Journ. 121. 3 hr. Open only to junior, senior, and graduate public relations majors. Here the student learns through on-the-job training and from reports of those who have on-the-job experience. Course structured along a public relations agency organization and operations.
222. *Public Relations Case Studies*. II. 3 hr. PR: Journ. 122 or 123. Seminar based on in-depth studies of public relations programs developed and applied by profitmaking and non-profitmaking organizations. Primary emphasis on successful campaigns, but unsuccessful efforts also will be examined for cause of failures.
227. *History of Journalism*. I, II, S. 3 hr. PR: Hist. 52 and 53 or consent. Open to all University students. Impact of the American press on the nation; development of today's media from the beginnings in seventeenth century England and in the American colonies; great names in journalism; freedom of press and its current implications.
228. *Law of the News Media*. II. 3 hr. For seniors and graduate students. The law as it affects the mass media. Considered are such areas as libel, public records, criminal pre-trial publicity, freedom of information, obscenity.
230. *Editorial and Critical Writing*. I. 3 hr. Open to all University students. The student will analyze and write editorials and commentaries; study typical editorial pages and the ethics governing editorial page content; become familiar with libel, privacy, contempt, and other problems — operating and political — as they arise.
251. *Direct Mail Advertising*. I. 3 hr. PR: Journ. 113 and 114 or consent. Mailing, marketing, and creation of direct mail letters, brochures, involvement pieces, and reply cards. Postal regulations, direct mail law, and printing procedures. Two lec., one lab.
284. *Public Affairs Programming*. I, II. 3 hr. PR: Journ. 183 and consent. Preparation and presentation of public issues via television. Methods of topic selection, research, organization of ideas and script development, alternate formats, ethical and legal constraints.
285. *Special Topics in Broadcast Journalism*. I, II. 1-6 hr. PR: Journ. 284 and consent. Directed independent investigation of selected topics in broadcast journalism. (Repeatable up to 6 hr.)

286. *Radio and Television Advertising*. I. 3 hr. PR: Journ. 113 and consent. Radio and television writing techniques. Media planning, buying; market analysis. Federal regulations affecting advertising.
289. *Documentary Motion Picture Production*. II. 3 hr. PR: Journ. 189 and 281 or Sp. Com. 184 or 280. In-depth development of the techniques and resources utilized in the production of a complete documentary motion picture. Films, processing, cinematography, editing, research, writing, music, narration. Lab oriented. It may be necessary for students to pay for camera rental and for their own film stock and film processing.
299. *Contemporary Media Issues and Ethics*. I, II. 3 hr. Required of all senior journalism majors. In-depth study of contemporary media issues such as right of access to media, morality in news and advertising, new FTC and FCC regulations, media responsibility to society, social responsibility of media professionals. Individual research papers on issues with ethical considerations.
302. *Seminar in Communications Theory*. I. 3 hr. PR: Studies in human behavior. Communications theory drawing heavily on social psychology and sociology/anthropology. Philosophy of science. Theory as scientific knowledge. Characteristics of theory. Begin learning how to draw on experts, to apply theory. Begin thesis.
312. *Fund-Raising and Foundation Management*. I, II. 3-6 hr. Open to graduate students and to seniors with 3.0; consent. Seminar. Expertise provided by WVU Office of Development staff and other University officials. Serve on staff for fund-raising, alumni relations, public relations. Produce journalism alumni newsletter.
315. *Seminar in Journalism Education*. I, S. 1-3 hr. Journalism education problems. Each student does an individual research project planned to provide for professional development as a journalism teacher. Emphasis on secondary school problems.
339. *Seminar in Advanced Advertising-Management Problems*. II. 3 hr. Recently developed ideas and techniques in advertising, advertising research, and media management.
341. *Special Topics*. I, II, S. 1-6 hr.
343. *International Communications*. I. 3 hr. International news gathering and dissemination — including wire services, broadcast satellites, and political barriers — will be examined, particularly as these factors affect a free exchange of information within the world community. Efforts by the United Nations to encourage news exchange and to lower news barriers will be a major case examination.
344. *Seminar in the Foreign Press*. II. 3 hr. Studies in legal and communications problems of the international flow of news and opinion; international press codes; communications media of major countries.
380. *Thesis*. I, II, S. 2-6 hr.
401. *Research Methods and Literature*. II. 3 hr. PR: Journ. 302. Study of methods common to research in communications. Critical evaluation of communications research reports and the mass media. Familiarization with communications theories. Problems of mass communication.
422. *Seminar*. I, II, S. 1-4 hr.
490. *Teaching Practicum*. I, II, S. 1-3 hr.
497. *Research*. I, II, S. 1-15 hr.
499. *Colloquium*. I, II, S. 1 hr.



Medical Technology students in laboratory.

Medical Technology

The WVU Medical Technology graduate program prepares graduate medical technologists for positions either as administrators and teachers in medical technology educational programs, or as supervisors in special areas of the clinical laboratory. The primary objective is to assist in development of knowledge in an area in administration, in education, or a special area of interest selected by the student which may be a special medical laboratory science as the specific area applies to laboratory medicine. Specializations include clinical chemistry, clinical microbiology, hematology, and immunochemistry. The specific coursework requirements for the master of science degree rests with the graduate adviser in the student's specific area of interest.

Admission

Applicants must have a baccalaureate degree in medical technology from an accredited institution or a baccalaureate degree in an allied field and be a certified medical technologist with the American Society of Clinical Pathologists. The area of concentration in medical technology desired by the student is considered in the evaluation of the undergraduate record as follows.

1. Individuals who desire to do special study in clinical chemistry, hematology, or immunochemistry must have completed 8 hours in physics, 3 hours in mathematics, 4 hours in organic chemistry, and 4 hours in quantitative chemistry on the college level.

2. Individuals who desire to do special study in microbiology must have completed 4 hours in organic chemistry and 16 hours in the biological sciences.

3. A minimum of one year's experience in a clinical laboratory is required for admission.

Students will be required to make up deficiencies in the above as well as other deficiencies deemed necessary by the adviser.

Applicants must have a minimum undergraduate grade-point average of 2.5 (based on A = 4 grade points) for admission.

Two letters of reference must be on file in the Medical Technology office. One letter should be from the major adviser in the undergraduate college and another from the immediate supervisor of the applicant's present position. An interview may be requested.

Applicants are selected for admission on the basis of scholastic standing, recommendations, and interest in the field of medical technology. The number of applicants accepted is necessarily limited by the available facilities; and in general, applicants with the most experience are considered first.

Application Procedure

A preliminary application is filed in the Medical Technology office.

Letters of recommendation are sent to the Medical Technology office from two individuals who are familiar with the applicant's ambitions, abilities, and qualifications.

After approval of the preliminary application, the admission procedure is the same as for other programs in the WVU Graduate School (see Part 2).

A personal interview may be required before final admission to the program.

Course of Study

I. It is expected that the students who enter the graduate program in Medical Technology will have a goal in mind and a special field of interest in medical technology. The program is tailored to the needs of the student as far as possible. A minimum of 36 semester hours of credit including a research problem is required. The student selects a major area of concentration from either education, supervision, or administration, and a minor area from clinical microbiology, clinical chemistry, clinical hematology, or immunohematology.

II. A minimum of 12 semester hours of coursework in education to include the following is required of all students:

A. All three of the following courses are required:

Ed. Psych. 330 — Advanced Educational Measurements.....	3 hr.
Ed. Psych. 320 — Introduction to Research.....	3 hr.
Ed. Found. 320 — Philosophy of Education	3 hr.

B. In addition to the above, the student selects *one* of the following:

Health Ed. 305 — Philosophy of Health Education.....	3 hr.
Ed. Psych. 361 — Communications and Educational Media	3 hr.
Ed. Psych. 450 — Psychological Foundations of Learning.....	3 hr.
Ed. Psych. 451 — Principles of Instruction.....	3 hr.
Ed. Adm. 330 — Principles of Education Leadership.....	3 hr.
Ed. Found. 300 — Sociology of Education.....	3 hr.

C. Ed. Psych. 311 or Stat. 311 (Statistical Methods) is strongly recommended.

Other courses to complete 36 semester hours are selected by the student (with the help of the adviser) in the area of concentration selected by the student. Students may select courses in departments in schools other than the School of Medicine.

All students must complete a minimum of 18 semester hours in a science related to medical technology including Seminar (3 hr.) and Problem Study (6 hr.).

All students must rotate for orientation purposes through all sections of the University Hospital Clinical Laboratories to include microbiology, hematology, chemistry, immunohematology, and histopathology for a minimum of two days in each laboratory or a total of ten days.

In addition, at the discretion of the student's adviser, other requirements in teaching, supervision, and administration may be necessary.

The adviser works out with the student a plan of study for the entire graduate program. This plan is usually made at the end of the first semester of the student's graduate study. A copy of this "plan of study" is signed by the adviser and student and sent to the Medical Technology office to be put in the student's file.

Examinations

A final written comprehensive examination in the major and minor interest areas is given before the date on which the degree is to be awarded.

An oral defense of the problem is given before the date on which the degree is to be awarded.

Requirements for Degree

All requirements for the master of science degree, as outlined in this *Catalog*, must be fulfilled. These requirements can be fulfilled in three semesters

of full-time work, but ordinarily at least four semesters are required for completion of the degree requirements. Degree candidates must have a 3.0 grade-point average and must have removed all incomplete grades and deficiencies.

Medical Technology

M.T.

- 300. *Seminar.* I, II, S. 1 hr. The student registers for 1 hr. each semester. Seminars include laboratory management, education in medical technology, and timely topics. Minimum of 3 hours of seminars to include all three topics is required.
- 497. *Research.* I, II, S. 1-15 hr. The student is required to pursue study on a problem in the student's area of concentration. This study is reported in a thesis-style manuscript. For this study and report, the student registers in M.T. 497. Total number of hours earned in M.T. 497 is determined by the student's adviser. As many as 9 semester hours may be taken during one semester or, by arrangement with the adviser, credit hours may be taken over several semesters. In the final compilation for degree requirements, only 6 semester hours in M.T. 497 will be counted toward fulfillment of the 36 required semester hours for the degree even though the student may have registered for as many as 15 hours in M.T. 497.



Mineral and Energy Resources students research methods of removing sulphur from coal.

College of Mineral and Energy Resources

The College of Mineral and Energy Resources offers graduate curricula leading to the Master of Science degree in two fields: mining engineering and petroleum engineering. A student desiring to take courses for graduate credit in the College of Mineral and Energy Resources must first apply for admission to the Graduate School and state the major field.

An applicant with a baccalaureate degree or its equivalent in the major field corresponding to the graduate study desired (from a department accredited by the Engineers' Council for Professional Development), will be admitted on the same basis as graduates of WVU. Lacking these qualifications, the applicant must first fulfill the College of Mineral and Energy Resources requirements in the field in which the student is seeking an advanced degree.

Academic Standards. Each student will, with the approval of the student's graduate committee — appointed by the consent of the student within the first semester of registration — follow a planned program. The program contains a minimum of 24 hours of coursework and 6 hours of independent and original study in the minerals field leading to a master's thesis. The student must obtain at least 60 percent (18 hours) of his course credits from 300-level or 400-level courses while the remainder can be made up of 200-level courses.

Approval for candidacy for a graduate degree by faculty action is required to establish eligibility for a degree. A graduate student may request approval by formal application after completing a minimum of 12 semester hours of graduate courses with a grade-point average of at least 3.0 (B), based on all graduate courses in residence for which final grades have been recorded.

No credits are acceptable toward an advanced degree which are reported with a grade lower than C. To qualify for an advanced degree, a graduate student must have a grade-point average of at least 3.0 based on all courses completed in residence for graduate credit. Each candidate for a degree must select a major subject and submit a thesis showing independent, original study in the minerals field.

General Minerals Program

M.

200. *Elements of Mineral Conservation.* I. 3 hr. PR: Junior standing. Open to any WVU student. Economics of conservation for nonrenewable resources; traditional and modern views; new environmentalist concerns. Current and forecast demand and supply conditions for mineral and energy resources including coal, water, oil, gas, ores, and industrial minerals; causes of mineral loss and environmental costs in production and utilization; methods of environmental control and conservation in underground and surface mining.
207. *Earthquake Seismology.* II. 3 hr. PR: Physics 11. Earthquakes, their causes and area distribution; theory of elastic waves; principles of seismograph construction, adjustment and operation; interpretation and calculation of seismograms with exercises provided by records of the University seismography station. 1 hr. lec.
230. *Elements of Geophysical Prospecting.* I. 3 or 4 hr. PR: Geol. 1, Physics 11. Locating subsurface oil, gas, and mineral deposits. Field investigation using instruments with 4 hr. section.

250. *Evaluation of Capital and Operating Costs in the Mineral Industries*. I. 3 hr. Estimating capital and operating costs of mineral industries. Evaluation of potential investments, comparisons of investment alternatives, estimation of profitability, and payout of new ventures. Special problems of investment decisions in mining, petroleum, and other facets of the mineral industries.
300. *Readings in Mineral Resource and Energy Economics*. I, II. 3 hr. Review of current mineral economic studies of the National Materials Policy Commission and National Academies.
301. *Topics in Resource Science*. S. 3 hr. PR: Chem. 141, Geol. 151, C.S. 261. Relationship between entropy and geologic anomalies, mineral occurrence models, resource conservation, and entropic balances.
381. *Theory and Policy of Mineral Economics*. II. 3 hr. Defines the pure theory of resources and energy allocation with technological, geological, and environmental constraints.
398. *Models of Mineral Commodity Markets and Industries*. II. 3 hr. PR: I.E. 250 or equiv. Econometric studies analyzing the behavior and problems of selected mineral industries and commodities from viewpoint of firm, industry, and region of interest.

Engineering of Mines

E.M.

201. *Fire Control Engineering*. II. 3-4 hr. PR: Senior standing in an engineering curriculum or consent. Aspects involved in the control from fire, explosion, and other related hazards. Protective considerations in building design and construction. Fire and explosive protection organization including fire detection and control. Lectures (3) and/or 3 hr. lab.
209. *Mineral Preparation*. II. 3 hr. PR: M.E.M. 52, C.E. 115, or consent. Preparation, beneficiation, and concentration of metallic and nonmetallic ores for further processing or utilization. 2 hr. lec., 3 hr. lab.
212. *Advanced Mining*. II. 3 hr. PR: E.M. 108; PR or Conc.: E.E. 105. Engineering principles, methods, and equipment applied to mine transportation, hoisting, and drainage. 3 hr. lec.
213. *Mine Ventilation*. I. 3 hr. PR: E.M. 108, M.E.M. 52, C.E. 115. Principles, purposes, methods, and equipment pertaining to the ventilation of mines. 2 hr. lec., 3 hr. lab.
215. *Industrial Safety Engineering*. I, II. 3 hr. PR: Junior standing or consent. Problems of industrial safety and accident prevention, laws pertaining to industrial safety and health, compensation plans and laws, and industrial property protection. 2 hr. lec.
216. *Mine Safety Engineering*. I. 3 hr. PR: E.M. 108 or consent. Analysis and application of mining health and safety laws to the work processes of the mining industry.
217. *Coal Preparation*. I, II. 3 hr. PR: E.M. 108, 209, or consent. Formation of coal, rank classification of coal, coal petrography, principles of preparing and beneficiating coal for market with laboratory devoted to sampling, screen analysis, float and sink separation, and use of various types of coal cleaning equipment. 2 hr. lec., 3 hr. lab.
218. *Advanced Mineral Preparation*. I. 3 hr. PR: E.M. 209. Theory and practice of concentration of ores, and industrial minerals with special consideration to more recent advances in beneficiation of ores and coal. 2 hr. lec., 3 hr. lab.
219. *Advanced Mining Methods for Vein Deposits*. II. 3 hr. PR: E.M. 108. Methods and systems of mining other than flat seams. Emphasis on selection of methods in relation to cohesive strength of ore bodies and their enclosing wall rocks. Mining of anthracite included. 3 hr. lec.
220. *Mine Design*. I. 3 hr. PR: E.M. 212, 213, 241. Comprehensive design problem involving underground mining developments or surface plant or both, as elected by the

student in consultation with instructor. A complete report on the problem required, including drawings, specifications, and cost analysis. 9 hr. lab.

221. *Mine Design*. II. 2 hr. PR: E.M. 212, 213, 241. Design principles and methods pertaining to mine water treatment, refuse disposal and treatment, dust control systems, reclamation and revegetation.
222. *Mine Equipment and Machinery*. II. 3 hr. PR: E.E. 106, E.M. 212. Selection, installation, operation, and maintenance of mining equipment. 3 hr. lec.
223. *Mine Management*. II. 3 hr. PR: Math. 18, E.M. 108, 212, and senior standing. Economic, governmental, social, and cost and labor aspects of mining as related to the management of a mining enterprise. 3 hr. lec.
224. *Mining Engineering Problems*. I, II. 1-6 hr. PR: Senior or graduate standing or consent. Special problems in mining engineering, including choices among operations research, mine systems analysis, coal and mineral preparation, and coal science and technology.
228. *Mine Equipment and Machinery Controls*. I. 3 hr. PR: E.M. 222 or consent. Principles, application, and use of electric and hydraulic devices and circuits for protection and control of mine machinery and equipment. 3 hr. lec.
229. *Advanced Mining Equipment Applications*. II. 3 hr. PR: E.M. 228. Structural, mechanical, hydraulic, and electrical characteristics of the more common items of mining equipment. Controls, electrical and hydraulic circuits, and mechanical transmissions with associated problems. Laboratory design of a control system for a mining machine. 2 hr. lec., 3 hr. lab.
234. *Applied Geophysics*. II. 3 hr. PR: Physics 102 and Geol. 151 or consent. Origin of the universe and the planets, heat and age of the earth. Application of the science of geophysics in the location and analysis of earthquakes and in prospecting for oil and minerals.
241. *Mechanics of Ground Control in Mines*. I. 3 hr. PR: M.E.M. 52, Math. 18, E.M. 108 or consent. Structure of the earth's crust, bedding planes, joints, heterogeneity, mechanical properties of rocks, stress-time-deformation relationships in rocks, theoretical stress distribution about mine openings, practical effects, factors in mine pillar design, pillar bursts, creeps and squeezes, mining subsidence. 2 hr. lec., 3 hr. lab.
247. *Explosives Engineering*. I, II. 3 hr. PR: Chem. 16, M.E.M. 51, 52. Theory and application of explosives, composition properties and characteristics of explosives reactions, effects on materials, blasting design fundamentals, legal and safety considerations. 3 hr. lec.
249. *Rock Mechanics*. I. 3 hr. PR: M.E.M. 51, 52, or consent. Elastic and plastic properties of rock, Mohr's criterion of failure, elastic theory, stress distribution around underground openings, open pit and underground stability rock testing techniques. 2 hr. lec., 1 hr. lab.
290. *Surface Mining*. II. 3 hr. PR: E.M. 108, Geol. 151, M.E.M. 52, or consent. Open pit mining, quarrying, and stripping, with emphasis on planning, production, and equipment systems. Application of principles of mechanics to slope stability problems in rock. 3 hr. lec.
- 301, 302. *Advanced Mine Design*. I, II. Credit arranged. Advanced detail design and layout of coal mine plant, particularly incorporating new ideas of machines and mining methods.
307. *Explosive Engineering Design*. II. 3 hr. Rock drilling mechanism, total blast systems simulation, experimental studies in blast design, rock fracturing, chemical thermodynamics, kinetics, and reaction rates.
351. *Coal Mining*. S. 3 hr. PR: Chemistry, 10 hr.; Physics, 8 hr.; and accompanied or preceded by general geology. Especially for students who are planning to teach

mining subjects in high school. Not open to students taking E.M. 108 or 212. Hours arranged.

365. *Advanced Deterministic Methods for Mineral Engineers*. I. 3 hr. Analysis and solution of mineral engineering problems which require use of deterministic models. Application of deterministic methods to mineral transportation, mineral resource allocation and extraction problems, and mine planning and equipment utilization problems. 3 hr. lec.
366. *Advanced Stochastic Methods for Mineral Engineers*. II. 3 hr. Application of stochastic methods to mineral engineering problems in equipment selection, renewal processes, mine ventilation, mine production, and mineral extraction. 3 hr. lec.
- 395, 396. *Graduate Seminar in Coal Mine Operation and Administration*. I, II. 3-6 hr. PR: B.S. degree and consent of committee. Problems related to production, preparation, marketing, and utilization of coal, with special assignments and emphasis in accordance with personal background and field of interest of student.
497. *Research*. I, II. 1-15 hr.

Petroleum Engineering

Pet.E.

207. *Natural Gas Engineering*. I. 4 hr. PR: Pet.E. 211, C.E. 115. Principles of natural gas production, transmission, distribution, processing, regulation, measurement, storage, and analysis with a laboratory devoted to principles of equipment utilized in the operations. 3 hr. lec., 3 hr. lab.
210. *Drilling Engineering*. I. 3 hr. PR or Conc.: Geol. 1, Math. 18, C.E. 115, I.E. 213. Rock properties, well-bore hydraulics, air and gas drilling factors affecting penetration rate, slim-hole, lifting capacity liquid, air, or gas, two-phase flow, casing and casing string design, well-bore primary and squeezing cementing, minimum cost drilling. 3 hr. lec.
211. *Production Engineering*. II. 3 hr. PR: Pet.E. 210. Performance of productive formation, drill stem tests, completion of wells, flowing wells, gas lift methods and equipment, pumping installation design, well stimulation, emulsion, treating, gathering and storage of oil and gas, field automation. 3 hr. lec.
212. *Drilling Fluids Laboratory*. I. 1 hr. PR or Conc.: Pet.E. 210, Chem. 141, C.E. 115. Drilling fluids control relative to pilot testing, drilling fluid design procedures and measurement of composition and properties. 3 hr. lab. and discussion.
216. *Petroleum Engineering Design*. II. 3 hr. PR: Pet.E. 234. Comprehensive problem in design involving systems in oil and gas production, field processing, transportation, and storage. Three 3-hr. labs.
224. *Petroleum Engineering Problems*. I, II. 1-6 hr. PR: Graduate or senior standing. Investigation and detailed report on a special problem in petroleum or natural gas engineering. Supervised by a member of the faculty.
233. *Elements of Petroleum Reservoir Engineering*. II. 3 hr. PR: Pet.E. 236. Basic properties of petroleum reservoir rocks. Fluid flow through porous materials. Evaluation of oil and gas reserves. 3 hr. lec.
234. *Applied Petroleum Reservoir Engineering*. I. 3 hr. PR: Pet.E. 233. Application of reservoir engineering data to calculation of recovery potentials and to analysis, simulation, and prediction of reservoir performance under a variety of production methods to effect maximum conservation. 3 hr. lec.
235. *Formation Evaluation*. II. 3 hr. PR: Math. 17, Pet.E. 210 or consent. Various well logging methods and related calculations with exercises in interpretation of data from actual well logs. 2 hr. lec., 3 hr. lab.

236. *Mechanics of Hydrocarbon Fluids*. I. 3 hr. PR or Conc.: Chem. 141. Qualitative and quantitative phase behavior of single and multicomponent hydrocarbon systems with emphasis on application to petroleum production engineering and petroleum reservoir engineering. 2 hr. lec., 3 hr. lab.
241. *Oil and Gas Property Evaluation*. II. 3 hr. PR: Pet.E. 211, 234, 235. Petroleum property evaluation. Calculation of reserves and future reservoir performance, decline curves, production and formation testing, pressure transient analysis, reservoir test limit, analysis of data, curve fitting, evaluation of processing facilities, and analysis of profitability. 3 hr. lec.
244. *Petroleum Reservoir Engineering Laboratory*. II. 1 hr. PR or Conc.: Pet.E. 233. Laboratory evaluation of basic and special petroleum reservoir rock properties.
300. *Hydrocarbon Production From Carbonate Rocks*. I. 3 hr. PR: Pet.E. 235. Theory on the production of oil and gas from carbonate rocks, definition and classification of pore geometry, fluid flow characteristics, performance of carbonate rock reservoirs and stimulation of these reservoirs. 3 hr. lec.
301. *Advanced Petroleum and Natural Gas Engineering Design*. I, II. Credit arranged. PR: Graduate or senior standing. Advanced detail design problems in some phase of petroleum and natural gas exploration, production, and transportation, particularly incorporating new ideas, machines, and methods.
302. *Fluid Flow in Porous Media*. I. 3 hr. PR: Pet.E. 234, Math. 18 or consent. Theoretical and practical aspects of the physical principles of hydrodynamics in porous media. 3 hr. lec.
340. *Secondary Recovery of Oil by Water Flooding*. II. 3 hr. PR: Pet.E. 233. Theory of immiscible fluid displacement mechanism, evaluation and economics of water flood projects, and oil field flooding techniques. 3 hr. lec.
342. *Well Stimulation: Fracturing*. I. 3 hr. PR: Pet.E. 210, 233. Hydraulic fracturing; fracturing tools, fluids, and orientation; propping agents and general design treatment for optimum profitability. 3 hr. lec.
343. *Advanced Secondary Recovery*. I. 3 hr. PR: Pet.E. 340. Secondary recovery of oil by gas flooding, miscible fluid injection, *in situ* combustion, and heat injection. 3 hr. lec.
351. *Thermodynamics of Reservoir Fluids*. I, II. 3 hr. PR: Pet.E. 207, 236. Thermodynamic properties of single and multiphase hydrocarbon fluids. Processing natural gas and petroleum crudes and fluid dynamics of processed fluids. 3 hr. lec.
352. *Substitute Liquid Fuel Processes*. I. 3 hr. PR: Graduate standing or consent. Heat and mass transfer and systematic methods of materials and energy balances. Energy conversion processes for coal gasification, retorting tar sands, oil shales, and underground storage of natural gas. Substitute liquid fuel manufacturing processes from gaseous fuels, direct liquefaction of coal, and some unconventional sources discussed.
362. *Reservoir Simulation and Modeling*. II. 3 hr. PR: Pet.E. 302, Math. 18, I.E. 281, or consent. Finite difference equations and their applications for fluid flow equations in porous media, types of grids, explicit and implicit schemes, material balance equation for oil and gas reservoirs, solution of single-phase, two-phase and three-phase flow in one, two, and three dimensions, simulation of depletion drive reservoirs, gas reservoirs, and other simulation methods. 3 hr. lec.
394. *Special Topics*. I, II. 1-6 hr. PR: Consent. Selected fields of study in petroleum and natural gas engineering.
497. *Research*. I, II. 1-15 hr.



Laboratory work in Pharmacy

School of Pharmacy

The School of Pharmacy offers programs of graduate study leading to the degree of Master of Science in the pharmaceutical sciences. Students may specialize in pharmaceuticals, pharmacy administration, pharmacognosy, pharmaceutical chemistry (organic medicinal or pharmaceutical analytical), pharmacy, or pharmacology.

Information concerning the School of Pharmacy's bachelor's program is available in the WVU *Undergraduate Catalog*.

Admission

Applicants for admission to the program must satisfy the general requirements for admission to the WVU Graduate School. Beyond this, the applicant should possess a B.S. degree with a minimum overall average of 2.75. In exceptional cases, a student with course deficiencies or with a grade-point average below 2.75 may be admitted as a special graduate student. The record of the student will be reviewed at the end of 12 hours, and the student may be allowed to pursue a degree program upon removal of any deficiencies and/or demonstration of ability to perform satisfactorily in the graduate program.

Academic Standards

No credits are acceptable toward a graduate degree which are reported with a grade lower than a C.

The graduate student must have a cumulative grade-point average of at least 3.0 in all graduate courses to qualify for the degree.

Requirements for Completion of Degree

Upon acceptance to the program, the student will select the student's major adviser who will also serve as chairman of the student's advisory committee and of the student's examination committee, and as thesis supervisor. The advisory committee will approve a plan of study and a research project for the thesis requirement.

To be eligible for the degree, the student must complete a minimum of 30 hours of graduate credit, of which no more than 6 hours may be for research and thesis.

Upon completion of the coursework and research requirements, and after submission of the thesis, an oral examination will be administered by the appointed examination committee.

Further information may be obtained by writing to: Dean, School of Pharmacy, West Virginia University, Morgantown, WV 26506.



WVU Coliseum houses the School of Physical Education.

School of Physical Education

Graduate students in the School of Physical Education pursue courses and scholarly tasks which may lead to the following degrees: Doctor of Education, Certificate of Advanced Study with concentration in Physical Education or Safety Studies, Master of Science with concentration in Physical Education, Sport Studies, or Safety Education.

DOCTOR OF EDUCATION

Areas of faculty competencies and student interest areas for the Doctor of Education degree include: (a) motor learning, sport management, sport physiology, sport psychology, and sport sociology, and (b) safety management, emergency preparedness, and educational aspects of safety applied to schools and industry.

Admission Procedures

Individuals who wish to pursue a program leading to the Doctor of Education degree must be admitted to the WVU Graduate School. Applicants for admission must submit: (1) scores on the Aptitude Test of the Graduate Record Examination, (2) three letters of recommendation (one of which must be submitted by the applicant's immediate employment supervisor), and (3) a complete transcript of undergraduate and graduate education up to time of application. The applicant must comply with the general regulations of the Graduate School. Whenever practical a personal interview with the members of the Graduate Studies Advisory Committee of the School of Physical Education is recommended. All materials and procedures must be completed by March 1.

Acceptance as an advanced graduate student is contingent upon the Graduate Studies Advisory Committee's decision regarding the applicant's potential for scholarly productivity as judged by the Graduate Record Examination scores, past performance in coursework, letters of recommendation, and personal interview. Applicants who satisfy the minimal standards for admission will be assigned a temporary adviser and will assume the status of an advanced graduate student.

Admission to the Program Procedures

Within the semester the advanced graduate student is completing the ninth hour of resident coursework the student shall request, through the Office of the Chairperson of the Graduate Studies Advisory Committee of the School of Physical Education, admission to the program. This request may be made at any time during regular sessions of the University.

Advanced graduate students cannot register for coursework beyond the ninth hour without having been admitted to the program.

Following the request of the advanced graduate student the Graduate Studies Advisory Committee will convene and decide upon admittance to or rejection from the program. The student need not be present at this meeting. In complex cases where a decision is difficult the student will be summoned to appear before the committee for further deliberation.

Program Requirements

Once the student is admitted to the program the student, in concert with the adviser, will select an advisory committee consisting of graduate faculty. It will be this committee's responsibility to aid the student in planning the total program. During the process of completing a program a student is expected to fulfill a residency requirement specified by the committee.

Admission to Candidacy Requirements

As the student nears the termination of the coursework, application may be made to complete the final comprehensive examination. This examination shall consist of scholarly tasks designed to function as a comprehensive learning experience. The examination will be constructed by the student's advisory committee. The student shall be allowed to complete this examination one time and if unsuccessful may be permitted to recomplete the examination one more time upon an appeal and subsequent sanction of the student's advisory committee. There must be a time period of at least six months between the first and second examination periods.

Upon successful completion of the final comprehensive examination the student may then present to the advisory committee a prospectus of the dissertation. If the opinion of the committee is such that the student may proceed with the dissertation the student is admitted to candidacy.

Final Requirements

Upon the completion of the dissertation the candidate will appear before the advisory committee for purposes of orally defending the study. Successful defense of the dissertation results in the awarding of the degree.

Time Limitation

All requirements must be completed within seven years immediately preceding the awarding of the degree.

CERTIFICATE OF ADVANCED STUDY PROGRAM

The program is designed to prepare school and other personnel who wish professional education beyond the master's degree. Candidates for this Certificate may choose either Physical Education or Safety Studies. Applicants for admission must submit: (1) scores on the Aptitude Test of the Graduate Record Examination; (2) three letters of recommendation (one of which must be submitted by the applicant's immediate employment supervisor); (3) a complete transcript of undergraduate and graduate education up to time of application; and (4) otherwise comply with the general regulations of the Graduate School.

Entrance Requirements

Applicants who have received bachelor's and master's degrees from an accredited institution are eligible for admission to the Certificate of Advanced Study program. Applications may be obtained from the WVU Office of Admissions and Records. Students will be admitted on the basis of undergraduate and graduate transcripts of earned course credit. Upon admission to WVU the stu-

dent is automatically admitted to the program. If a person applies for consideration as a candidate for the Certificate of Advanced Study, and at some future date wishes to change the degree objective, it will be necessary to reapply to participate in the revised program.

Program Requirements

Upon admission the student, in concert with the major adviser, will select an advisory committee consisting of two additional members of the graduate faculty. This committee will aid the student in the construction of his or her program.

The program shall consist of a minimum of 30 course hours; 6 of these hours must be earned by successful completion of the Certificate of Advanced Study final scholarly project. This research requirement may be conducted apart from the physical limits of WVU but must be done under direction and supervision of the chairperson of the student's graduate committee.

Final Requirements

Upon completion of coursework and the final scholarly project the student will orally defend the project before the advisory committee.

The candidate shall submit two bound and approved copies of the research problem to the Dean of the Graduate School. The format and binding procedures for the research problem are governed by Graduate School regulations.

Time Limitation

All requirements must be completed within five calendar years immediately preceding the awarding of the Certificate of Advanced Study.

MASTER OF SCIENCE IN SCHOOL PHYSICAL EDUCATION OR SPORT STUDIES

The School of Physical Education offers courses leading to the Master of Science degree, with an emphasis in School Physical Education or Sport Studies.

Students are admitted as regular graduate students for work leading to the Master of Science degree in the School of Physical Education, provided they hold a baccalaureate degree from an approved institution of higher education; have a 2.75 undergraduate grade-point average; and satisfy prerequisites in the courses for which they register.

Students who do not meet the 2.75 grade-point average requirement but exceed a grade-point average of 2.5 may be admitted as a Regular Graduate Student with deficiencies and will be required to earn a 3.0 average in the first 9 hours of residence work in order to continue major interest area. (Courses taken in off-campus education are accepted for degree purposes provided the student has had prior approval from the student's adviser.) In order to receive the degree the student must have a minimum 3.0 average in all coursework leading toward the degree and satisfy all Graduate School requirements.

Thirty-six semester hours are required for the Master of Science degree, distributed as follows:

- I. Satisfactory completion of the disciplinary core courses for the Master of Science degree. These are: P.E. 320, 340, 360, 380.
- II. In addition to the basic disciplinary core the student may elect to pursue either the curriculum devoted to School Physical Education or Sport Studies:
 - a. *School Physical Education*
 1. 12 semester hours of basic Physical Education core.
 2. 6 semester hours of professional Physical Education courses including: P.E. 305 and 445.
 3. 3 semester hours of research methodology: P.E. 315.
 4. 15 semester hours elected in approved courses and successful completion of a comprehensive examination during final semester of coursework. (Comprehensive examinations usually are administered during April, July, and November.)

or

3 hours of approved electives plus 6 hours of thesis.
 - b. *Sport Studies*
 1. 12 semester hours of basic Physical Education core.
 2. 6 semester hours in research and statistics: P.E. 315 and 446.
 3. 12 semester hours elected from approved courses.
 4. 6 semester hours of thesis.

MASTER OF SCIENCE IN SAFETY EDUCATION

Concentration in Safety Education at the master's degree level provides opportunity for individuals to elect courses and related experiences aimed at developing competencies needed by driver safety educators, occupational safety managers, or school safety coordinators. Baccalaureate degree programs from which students are usually admitted include business management, engineering, technology education, physical education, physical science, psychology-sociology/anthropology, or safety, provided that a 2.5 grade-point average has been achieved. Otherwise, admission must be of provisional status which requires the student to earn a 3.0 average on the first 12 semester hours of residence work and also pass qualifying examinations in order to continue.

Regulations of the Graduate School govern the general requirements of the master of science degree. Additionally, however, the candidate must complete a minimum of 36 semester credit hours including an approved research experience in safety to qualify as a degree recipient. A grade-point average of 3.0 will be required for graduation.

Coursework must be planned in consultation with the adviser and approval must be obtained from the adviser before enrollment in courses. Six semester hours of coursework may be devoted to directed electives from one of the student's undergraduate major or minor fields or from a field allied to safety. Students are encouraged to complete the Aptitude Test of the Graduate Record Examination within the first 18 semester hours after matriculation. By this same time, students will be expected to have completed the following core of courses: Saf. S. 300, 310, 311, and 418 or equiv.

A student is accepted as an advanced candidate for the degree providing coursework and requirements previously mentioned are of a satisfactory nature as judged by the graduate committee of the department. During the final term

or semester of study, each student will be required to pass successfully an examination dealing with the core subject matter and specialization emphasis.

Special Advanced Graduate Students

Provision is made within the School of Physical Education which would permit an individual to apply for admission as a special advanced graduate student. The individual who wishes to pursue this course of action must indicate this intention on the application form provided by the WVU Office of Admissions and Records. If a special advanced graduate student wishes to change the degree objective to that of the doctorate, it will be necessary to reapply for that particular program.

Physical Education

P.E.

- 221. *Advanced Athletic Training. I.* 3 hr. PR: P.E. 121, 164, 165; NTR 71; and Saf. S. 70. An in-depth analysis of preventive measures and treatment procedures and practical experience using therapeutic modalities.
- 222. *Advanced Athletic Training. II.* 3 hr. PR: P.E. 221 or consent. Designed to analyze management procedures related to athletic training and provide practical experience in diagnosing and treating athletic injuries.
- 300. *Workshop in Physical Education. I, II, S.* 1-15 hr.
- 305. *Philosophical Concepts in Physical Education. I, S.* 3 hr. PR: Graduate standing or consent. Study of educational philosophies and application of these philosophies to physical education; study of the place of physical education in education and modern living.
- 306. *Scientific Interpretations of Physical Education. I.* 3 hr. PR: Doctoral standing. A synthesis of the behavioral and biological sciences as a foundation for advanced study in the disciplinary content of sport science and physical education.
- 315. *Research Methodology in Physical Education. I, S.* 3 hr. PR: Graduate standing or consent. Application of historical, descriptive, and experimental research strategies and designs to physical education.
- 320. *Individual Interaction in Sport and Physical Activity. I, S.* 3 hr. PR: Graduate standing or consent. Designed to acquaint the student with the reciprocal relationships between sport and physical activity and the societies and cultures out of which sport emerges.
- 340. *Psychology of Sport and Physical Activity. I, S.* 3 hr. PR: Graduate standing or consent. Psychological effects and implications of man's participation in sport and physical activity. Emphasis on the personality and motivational dynamics of sport involvement.
- 345. *Group Influences in Sports. I.* 3 hr. PR: Research, Statistics, P.E. 320, 340. The manner and degree to which selected psychological processes of individuals are affected by involvement in sports.
- 360. *Biomechanical Analysis of Sport and Physical Activity. II, S.* 3 hr. PR: P.E. 164 and 165 or equiv., or consent. Advanced principles of body mechanics and analysis of muscle and joint actions in coordinated movement and neuromuscular physiology.
- 365. *Psychomotor Behavior Analysis. II, S.* 3 hr. PR: Graduate standing or consent. In-depth study of psychomotor learning with emphasis on behavioral change in physical activity. Review of research and psychological thought pertinent to motor learning, performance, and physical activity.

367. *Theories of Sport Physiology*. I, S. 3 hr. PR: Doctoral standing. Thorough and workable knowledge of principles involved in the interactions of muscles and nerves, reflexes, metabolism, cardiopulmonary function, environmental physiology, and the practical application of work physiology.
380. *History of Sport and Physical Activity*. II, S. 3 hr. PR: Graduate standing or consent. Anthropological and historical approach toward the influence of events, political and social climates, and personalities upon the sport cultures from early civilizations to present.
425. *Educational Sport*. II. 3 hr. PR: Stat. 311, P.E. 306, 465. The group dynamics of the sport situation for purposes of gaining insight into techniques and methods of modifying social behavior through physical education sport activities.
445. *Program Planning* II, S. 3 hr. PR: Graduate standing or consent. An in-depth study of the manner in which the physical education environment is structured to elicit cognitive and psychomotor learnings. Emphasis on program design, behavior modification, and evaluation processes.
446. *Advanced Measurement in Physical Education*. II, S. 3 hr. PR: Graduate standing. Extension and application of basic concepts of statistical evaluation to physical education.
460. *Management Processes in Physical Education*. II. 3 hr. PR: Doctoral standing or consent. Analytical exploration of the situational, relational processes between the administrator of physical education school programs and the teacher of physical education, the physical education facility, and the physical education planned learning environment.
465. *Professional Physical Education Resource Seminar*. S. 3 hr. PR: Doctoral standing. Introductory seminar for doctoral professional physical educators. Discussions and readings of current thought about physical education in its historical perspective.
480. *Dissertation Seminar*. I, II, S. 3 hr. PR: Advanced doctoral standing. Critical analysis of the doctoral candidate's research proposal.
490. *Teaching Practicum*. I, II, S. 3-15 hr.
491. *Advanced Study*. I, II, S. 1-6 hr.
- 492-495. *Special Seminars*. I, II, S. 1-6 hr. ea.
496. *Graduate Seminar*. I, II, S. 1-6 hr.
497. *Research*. I, II, S. 1-15 hr.
498. *Thesis*. I, II, S. 1-15 hr.
499. *Colloquium*. I, II, S. 1-6 hr.

Dance

400. *History and Philosophy of the Dance*. I, S. 3 hr. PR: Dance 402 or equiv. Cultural survey of dance as an expression of the society it represents; philosophy of dance; relation of dance to other art forms; dance as an educational experience.
401. *Rhythms and Dance*. I, S. 3 hr. PR: Graduate standing and consent. Principles of movement, materials, and practicum in dance.
402. *Modern Dance Techniques and Composition*. I, S. 3 hr. PR: Dance 35 and 37 or equiv., graduate standing and consent. Scientific principles of movement; basic principles of music as related to dance movement; choreographic principles; practicum in dance movement. Principles for teaching dance and problems involved in planning programs.

403. *American Folk Dance*. I, S. 3 hr. PR: Dance 39 or equiv. American square, contra, circle, and round dances, and their relationships in the arts and aspects of American culture. Analysis of techniques in leading and calling.

Safety Studies

Saf. S.

231. *Safety in Motor Transportation Services*. II, S. 3 hr. PR: Saf. S. 131 or consent. Safety elements of automotive transportation equipment. Design, operation, planning and control plus effects of legislation. The school motor fleet.
233. *Disaster Preparedness and Emergency Systems*. I, S. 3 hr. PR: Consent. Major elements involved in disasters and emergencies, preparedness planning, systems utilization, and attention to essential human services, with emphasis on community action.
251. *Driver and Highway Safety Fundamentals*. II, S. 3 hr. PR: Saf. S. 131. Basic course for individuals who plan to teach courses to beginning drivers which emphasizes essential content, methods, and desirable practices for both classroom and laboratory applications. (\$20.00 course fee.)
254. *Teaching Driver and Highway Safety*. S. 3 hr. PR: Saf. S. 251 or equiv. and valid driver license. Teaching and coordinating driver and highway safety education in schools. Arranged laboratory assures practice in providing behind-the-wheel instruction to beginning drivers. (\$20.00 course fee.)
255. *Special Topics*. I, II, S. 2-6 hr. PR: Consent. Consideration of persistent issues and changing problems in the safety field. Seminar emphasis extends considerable attention to safety interests of participating class members.
300. *Contemporary Safety Beliefs and Foundations*. II, S. 3 hr. Philosophies of the safety movement as expressed by leaders in the field are related to accident causation, accident prevention, and research implications.
310. *Environmental Aspects of Hazard Control*. I, S. 3 hr. PR: Saf. S. 300 or consent. Investigation of hazard control principles relating to environmental facilities and equipment including control procedures recommended by authorities from the fields of engineering, medicine, and public health as well as from the field of safety.
311. *Human Factors in Accident Prevention*. II, S. 3 hr. PR: Saf. S. 300 or consent. Investigation of concepts dealing with human behavior as related to accident experience in major reporting categories with consideration of psychological, sociological, and health implications.
335. *Safety Legislation and Compliance Operations*. I, S. 3 hr. PR: Saf. S. 300 or consent. Comprehensive study and analysis of federal and state legislation which mandates compliance with certain safety conditions and practices related to work performed in occupational and comparable settings.
336. *Safety and Loss Control Management*. I, S. 3 hr. PR: Saf. S. 300 or consent. Management guidelines, functional standards, and operational features applicable to safety and loss control programs designed for business, governmental, industrial, and educational enterprises.
337. *Personal and Environmental Safety Supervision*. II, S. 3 hr. PR: Saf. S. 300 or consent. Supervisory methods, tools, and techniques designed to develop safety leadership qualities, to promote human relations, and to motivate employee responsibility for safe living practices.
351. *Safety Education Principles and Content*. II, S. 3 hr. PR: Consent. Study and analysis of content areas usually recommended for instructional programs within the field of safety, with emphasis on structured learning experiences.

356. *School and College Safety Administration*. II, S. 3 hr. PR: Consent. Current emphasis on administering safety education, safety services, and environmental safety at various program levels from elementary school through college.
418. *Safety, Measurement, Evaluation, and Research*. II, S. 3 hr. PR: Saf. S. 300. Analysis of evaluative data and statistical procedures applicable to the safety field plus investigation of nature and purposes of research dealing with safety and accident prevention with emphasis on human and environmental factors.
452. *Manpower Development for Safety Responsibilities*. II, 3 hr. PR: Graduate standing in Safety Studies and consent. Safety manpower positions, needs, and problems in relation to efforts by business, industrial, governmental and educational agencies to provide sufficiently effective professional and sub-professional preparation of safety practitioners.
454. *Safety Innovations and Problem Simulation*. S. 3 hr. PR: Saf. S. 251 and 454 and teaching experience in driver education or consent. Individual problems and newer media plus unique adaptations as revealed by research and current literature in the field.
458. *Fire Safety Program Operations Research*. II, S. 3 hr. PR: Saf. S. 310 or consent. Investigation and comparative analysis of fire safety operations with special attention to hazard identification, equipment selection, control techniques, related services, training desired, and personnel supervision emphasized among effectively functioning programs.
457. *Planning and Coordinating Safety Programs*. I. 3 hr. PR: Advanced graduate standing in Safety Studies or consent. Organizational structure, planning resources and techniques, and coordination functions involving safety program in business, industry, government, and education.
459. *Directed Study*. I, II, S. 1-6 hr. PR: Doctoral level standing and consent. Analysis of research designs and procedures for compilation, organization, treatment, and interpretation of data for safety research projects. (Required of all candidates for doctoral degrees in Safety Education.)
472. *Practicum*. I, II, S. 1-6 hr. PR: Graduate standing in Safety Studies and consent. Individual and/or group experiences in development, implementation, and participation in special projects involving safety education, safety services, and environmental safety in schools, colleges, or communities.
490. *Teaching Practicum*. I, II. 3-15 hr.
491. *Advanced Study*. I, II, S. 1-16 hr.
- 492-495. *Special Seminars*. I, II, S. 1-6 hr. each
496. *Graduate Seminar*. I, II, S. 1-3 hr.
497. *Research*. I, II, S. 1-15 hr.
498. *Thesis*. I, II, S. 1-15 hr.
499. *Colloquium*. I, II, S. 1-6 hr.

School of Social Work

The graduate program in social work, accredited by the Council on Social Work Education, leads to the degree of Master of Social Work. It normally requires two academic years and one summer for completion.

Social work, one of the oldest human service professions, is based upon social and behavioral science information which is used to understand and provide the basis for helping individuals, groups, and communities. Social work practitioners help people with personal, economic, social, political, and inter-group problems.

Graduate social work study involves classroom and field studies. Students spend two semesters and one summer session in classroom study. In addition, the student spends two full semesters in block field instruction placements that are carefully selected to provide learning opportunities under the guidance of experienced professionals.

The WVU social work program concentrates on preparation of people for leadership positions in rural and small communities, particularly those in the Appalachian region, which offers unique opportunities to study and work with changing social environments. Parts of the region are redeveloping from worked-out farms and mines to new industrial areas. The region faces out-migration and in-migration trends with all the personal adjustment and social organization problems such trends involve.

All field instruction is provided in the Appalachian region or agencies serving the region. Much of the classroom content focuses on the region and on studies designed to help students understand it.

Graduates are employed throughout the United States and Canada. They work as individual and family caseworkers, as group treatment specialists, community organizers, social researchers, social work educators, and administrators in a variety of programs, such as mental health clinics, hospitals, correctional institutions, courts, delinquency programs, aging programs, family counseling agencies, children's protective agencies, public welfare departments, public schools, community action agencies, settlement houses, city governments, state government planning agencies, federal administrative agencies, and private research and development organizations concerned with human problems. There has been a constant growth in the need for professional social workers. It is anticipated by the Bureau of Labor Statistics and other research bodies that the demand for social workers will continue to increase both in terms of the numbers required and in terms of the varieties of programs in which social workers are employed. The social work curriculum is designed to help students prepare for these careers. Students are required to work closely with their academic advisers in selecting appropriate components of class and field learning to meet their individual needs.

Curriculum

The five major instructional components in the Master of Social Work program are human behavior and the social environment, practice, social welfare policy and services, field instruction, and research.

The social worker is concerned with human behavior as it is manifested in the individual, in groups, and in communities. To understand these kinds of social phenomena, concepts from sociology/anthropology, psychology, and behavioral medicine and psychiatry have been selected for study. They are applied

to an interpretation of conformity and deviance, including behavior such as overcompliance, neuroses, delinquency, mental illness, anomie, and alienation.

The School of Social Work program emphasizes a comprehensive approach to social work practice. The student becomes a "specialized generalist" capable of understanding and actively engaging in a wide array of professional behaviors.

Throughout the first year, the student learns a comprehensive approach to social work practice, utilizing foundation principles, techniques, and values to practice social work with social systems of various sizes — from individuals to communities — as particular tasks require.

In the second year the student develops specialized expertise to complement generalist capacities by electing a concentration in either social work practice affecting individuals, families, and groups, or in social planning and community development.

A variety of options allows the student to concentrate on a program of study in social welfare planning, community organization and development, policy analysis, and program development and administration. Knowledge and skills in these areas are increasingly desirable in many of the newly emerging local, regional, and state planning structures and human resource development programs in such areas as health, child development, corrections, cooperative extension work, and others. A number of professional positions are emerging in these areas. Students interested in such careers should consult with faculty members who have knowledge of the community organization and planning fields to construct a course of study that will enable them to seek and fill such positions after graduation. The School of Social Work maintains field placements in a variety of such settings so as to provide the student with maximum opportunity to combine theoretical knowledge of the classroom with the problem oriented tasks of these newer and traditional settings.

Emphasis throughout the social welfare policy and services courses is placed upon values, conflict of interest, professionalism, methodology, history, ideology, economics, and socio-legal-political change as they relate to policy formation, and the tasks, resources, and roles of the social work professional. The courses deal with an analysis of the creation, institutionalization, and planning of social welfare policy and service in a democracy. Extensive consideration is given to selected social problems, such as poverty, health, family planning, crime, housing, urban decay, redistribution of political and economic power, socio-economic problems of Appalachia, and planning the future, as they affect and are affected by policy formulation.

The research curriculum gives the student technical knowledge in contemporary social science research methods, statistics, and computer usage as these have relevance to understanding and developing the knowledge requirements of social work practice. Emphasis is placed on application of research concepts to social work practice as a problem-solving activity, on conduct of research, and on assessment and utilization of the findings of contemporary social science.

Students are required to take a minimum of 6 semester hours (two courses) in research, including one of the advanced courses (all courses except the introductory methods course and the introductory statistics course). Students who have had an introductory methods course or an introductory statistics course on the undergraduate level are not required to take these courses in the School of Social Work. All others must do so. Students who have not had research or statistics courses of any nature on the undergraduate level are required to take

9 semester hours of research (three courses), including the introductory methods and the introductory statistics courses.

Field instruction is an integral part of the social work program. Primary consideration in making field instruction assignments is in the selection of field settings and locations which can fulfill the educational goals and objectives of the School of Social Work and which can meet the particular educational needs of the student. Consideration is given to the student's area of interest, family situation, and stipend requirement.

In the first and second years, students take field instruction during two alternating semesters. These field teaching and learning experiences are provided by field instructors who may be employed by the School of Social Work or who may be members of an agency staff. All field instructors work closely with faculty consultants.

The learning experiences assist the student in acquiring abilities for integrated practice and in developing the discipline and self-awareness essential to a professional social worker. Students select from a wide range of innovative practice settings which utilize both traditional and nontraditional approaches. While in the field, students are expected to both provide services to people and to learn from their involvement with human problems. Examples of the nontraditional approaches available include the linkage between graduate and undergraduate field instruction units and the evaluation and initiation of new manpower utilization programs.

A recent innovation in the field instruction program has been the opportunity for overseas placements. Students have been assigned primarily in Wales, United Kingdom, with the collaboration of the University College of Swansea. As an experiment, some students also were sent to East Africa in 1970.

The field instruction placements and instructors are:

Aging Project, West Virginia University, Marjorie Buckholz.
Allegheny County Chapter of the Pennsylvania Association for Retarded Children, Inc., Pittsburgh, PA, G. Richard Sell.

Appalachian Center, West Virginia University, Gary Theilen.
Appalachian Mental Health Center, Elkins, WV, Jerry Munsey.
Appalachian Regional Hospital, Beckley, WV, John Johnson.
Ashtabula County Family Service, Ashtabula, OH, John Radkowski.
Cameron, Elk, McKean, Potter Mental Health/Mental Retardation Clinic, Bradford, PA, Richard Laposky.

Central District Guidance Center, Clarksburg, WV, James Chapman and Geraldine Salisbury.

Chartiers Mental Health/Mental Retardation Center, Bridgeville, PA, Ed Strelinski and Richard Ney.

Child Development Unit of West Virginia, West Virginia University, Karen Harper.
Children and Family Service Association, Wheeling, WV, Palmer Ulman.
Chit Chat Farms, Wernersville, PA, Richard Miller.
Commission on Mental Retardation, Developmental Disabilities, Charleston, WV, George Bennett.

Community Services of Pennsylvania, Harrisburg, PA, Richard Bachman.
Concord College, Social Work Program, Athens, WV, Dan Fowler.
Department of Behavioral Medicine and Psychiatry, West Virginia University Hospital, Janice Cone, Patricia Porterfield, and Ellen Starkey.
Fairmont Clinic, Fairmont, WV, Sally Dodds.
Family Service Association, Morgantown, WV, Patricia Keith.
Family Service of Kanawha Valley, Charleston, WV, Betty Ann Smith.
Family Service of Marion and Harrison Counties, Fairmont, WV, Patricia Kronjaeger.
Fayette County Outreach to Children and Their Families, Uniontown, PA, Anna Belle Calloway.

Federal Reformatory for Women, Alderson, WV, Virginia Wilson.
 Garrett County Action Commission, Comprehensive Child Development Program, Oakland, MD, Patricia Finan.
 Governor's Committee on Crime, Delinquency, and Correction, Charleston, WV, Harold Metz.
 Hancock-Brooke Mental Health Services, Weirton, WV, David O. Miller.
 Health and Welfare Association of Allegheny County, Pittsburgh, PA, Marshall Gordon and Raymond Gordon.
 Human Resources Association-Valley Center, Fairmont, WV, Walter Case and Beatrice Hunter.
 Intermediate Court of Kanawha County, Charleston, WV, Eloise Crim.
 Job Corps Center for Women, Charleston, WV, Carole Glasser.
 Maternal and Infant Care Project, Morgantown, WV, Antoinette Arkle.
 Monongalia County School System, Morgantown, WV, Paul Rice.
 Mon Valley United Health Services, Inc., Monessen, PA, Frank Steck.
 National Association of Social Workers, Washington, DC, Glenn Allison.
 North Central West Virginia Community Action Association, Fairmont, WV, Dianthy LaVoie.
 Ohio Valley Medical Center, Wheeling, WV, Mary Jane Hess.
 Pennsylvania Board of Probation and Parole, Harrisburg, PA, Ron Copenhaver.
 Pittsburgh Residential Manpower Center, Pittsburgh, PA, John Turano.
 Ridgway Area Psychiatric Center, Ridgway, PA, John Yates.
 Robert F. Kennedy Youth Center, Morgantown, WV, Robert Gribben.
 Rural Manpower Research and Training Project, West Virginia University, John Miller.
 Somerset-Bedford Mental Health/Mental Retardation Program, Rockwood, PA, Ronald Bowers.
 South Hills Inter-Faith Ministries, Pittsburgh, PA, Lyndon Whybrew.
 Southwestern Community Action Council, Inc., Huntington, WV, Jerry Pullen.
 Student Counseling and Psychological Services, West Virginia University, William Green.
 Undergraduate Social Work Education, West Virginia University, Betty Baer.
 United Mine Workers of America — Welfare and Retirement Fund, Morgantown, WV, Betty Veach.
 United Way of Beaver County, Beaver, PA, William Stamatou.
 Valley Counseling Center, Morgantown, WV, John Peters.
 Veterans Administration Hospital, Chillicothe, OH, Arlen Miller and Vivian Lilly.
 Veterans Administration Hospital, Clarksburg, WV, Richard Chamberlain.
 Veterans Administration Hospital, Huntington, WV, Eric Cutlipp and Robert Ewing.
 Veterans Administration Hospital, Pittsburgh, PA, Alma Burgess.
 Wales Placement, University College of Swansea, Swansea, Wales, Alan Davies.
 Warren State Hospital, Warren, PA, Charles O'Hargan.
 West Virginia Rehabilitation Center, Institute, WV, Elizabeth Minton.
 Youth Development Center, Loysville, PA, David Clovsky.
 Youth Development Center, Waynesburg, PA, Ruth Pincus and Gloria Gugliotta.

Admission

Students are admitted for graduate study in the School of Social Work who meet all of the following requirements:

1. Graduation with a bachelor's degree from any accredited college or university.
2. Proof of academic achievement. Graduate school regulations require an undergraduate grade-point average of at least 2.5 for approval of candidates as regular graduate students. An undergraduate grade-point average less than 2.5 will be classified as *special-provisional* for those admitted.

3. Evidence of potential to practice social work, such as commitment to human service, and concern about and ability to work effectively with people.

Admission With Advanced Standing

Students may request up to one year's advanced standing if they meet the regular requirements of the Graduate School and the School of Social Work. In addition, applicants must:

1. Have received a baccalaureate degree in social work or social welfare awarded by an accredited college or university which is a constituent member of the Council on Social Work Education.

2. Have a highly ranked academic background (approximately a 3.0 cumulative grade-point average on a 4.0 scale.) *or*

3. Have received a master's degree in an allied field from an accredited college or university.

Request for advanced standing must be made at the time of application and approved by the Admissions Committee. Applicants who are granted one year of advanced standing will register to begin with the summer session and must complete that session plus no less than two additional semesters of graduate-level work. Disapproval of requests for advanced standing will not prohibit acceptance into the regular, full two-year program.

Part-Time Program

Applicants may elect to extend their graduate program up to a maximum of four years by specifically requesting part-time status in their application for admission. To be accepted, the student must meet WVU and School of Social Work entry requirements, have a definite objective of completing the master's program within a four-year period, and present an acceptable plan for completing requirements.

Transfer Students

Students who have completed graduate social work courses in other accredited schools of social work may apply for admission. If one year of such full-time study has been successfully completed, an applicant would be expected to begin with the summer session, complete it plus two additional semesters of full-time graduate-level work to earn the M.S.W. degree.

Recommended Application Date

Applicants are urged to complete their applications *before February 1st*, in order to guarantee their consideration for admission and for financial aids. First-year students are admitted *only* in the first semester of each academic year. Students admitted to the program with advanced standing or second-year status *must enter* in the summer session.

Requirements for Master of Social Work

The degree of Master of Social Work is conferred by the University upon those students who satisfactorily complete the requirements as established by the Graduate School. These requirements are:

1. *For students enrolled in the regular, twenty-one month M.S.W. program:* Satisfactory completion of no less than 67 semester hours which may have been earned through the WVU School of Social Work, West Virginia College of Graduate Studies, WVU off-campus credit program, or through approved graduate courses completed in other accredited institutions. Exceptions in this category would pertain to candidates whose degree plans required them to register for less than 28 semester hours of field instruction or for candidates whose earned credits entitled them to exemptions for certain courses. Candidates who transfer from other accredited graduate social work programs are required to successfully complete no less than 61 semester hours (since equivalent credit hours from other institutions may not match that which is offered by WVU).

2. *For students enrolled in the Advanced Standing, eleven-month M.S.W. program:* Satisfactory completion of no less than 37 semester hours of approved graduate courses at WVU including a full semester of field instruction plus other required courses together with electives and/or substitutions for approved graduate courses in the School of Social Work.

3. Students may request credit for up to 6 hours earned in graduate study in approved courses taken in other divisions of WVU; through graduate social work off-campus credit courses, or approved courses from other accredited universities. Such requests must be made at the time of application for admission and approved at that time, for students to be able to claim such credit toward the requirements for the M.S.W. degree.

4. Satisfactory completion of all components of the graduate program.

5. A cumulative average of at least 2.75 for the total graduate program.

A TYPICAL GRADUATE SOCIAL WORK COURSE LOAD

First Year

<i>First Semester</i>	<i>Hr.</i>
S.W. 321 — Human Behavior and Social Environment I.....	4
S.W. 331 — Social Welfare Policy and Services I	3
S.W. 340 — Introduction to Social Work Practice.....	5
S.W. 497 — Research I (Introduction to Social Research Methods or Introduction to Statistics)	3
	<hr/> 15

<i>Second Semester</i>	<i>Hr.</i>
S.W. 381 — Field Instruction I	5-14

Second Year

<i>Summer Session</i>	<i>Hr.</i>
S.W. 322 — Human Behavior and Social Environment II	2
S.W. 332 — Social Welfare Policy and Services II.....	2
S.W. 341 — Practice Affecting Individuals, Families, and Small Groups	2
S.W. 351 — Practice Affecting Organizations, Institutions, and Communities.....	2
S.W. 497 — Research II (Survey Design and Analysis or Principles of Program Design and Evaluation)	3
	<hr/> 11

<i>First Semester</i>	<i>Hr.</i>
S.W. 481 — Advanced Field Instruction II	5-14

Second Semester

The following are the recommended courses for the second semester. Within the recommended courses, all students are allowed to take one elective. One practice course (either S.W. 441 or 451) is required and the research course is required. Students, with the approval of their advisers, may take other electives, within or outside of the school. It is conceivable that one could also take both S.W. 441 and 451 under such a plan, if desired.

	<i>Hr.</i>
S.W. 421 — Human Behavior and the Social Environment III.....	2
S.W. 431 — Social Welfare Policy and Services III	2
S.W. 441 — Advanced Practice Affecting Individuals, Families, and Small Groups <i>or</i>	3
S.W. 451 — Practice in Advanced Planning and Social Development Strategies.....	3
S.W. 460 — Social Work Management	3
S.W. 380 — Special Topics (Elective) <i>or</i>	2-3
S.W. 480 — Seminar (Elective).....	2-3
S.W. 497 — Research III (Research Methodology in Community and Organizational Studies <i>or</i> another advanced course).....	3
	14-15

All full-time students must carry a minimum of 13 hours and five courses during the final semester.

Social Work

S.W.

- 321. *Human Behavior and the Social Environment I.* 4 hr. Provides an interdisciplinary foundation of selected theoretical approaches for understanding behavior of individuals, small groups, organizations, and communities. Application to social work practice demonstrated by examining material on Appalachia, poverty, and discrimination. Emphases of discussion sections vary according to student preparation.
- 322. *Human Behavior and the Social Environment II.* 2 hr. Objective is to increase understanding of organizations, communities, and small groups as they develop, change, and affect behavior of those affiliated with them.
- 331. *Social Welfare Policy and Services I.* 3 hr. Processes of policy formation, with emphasis on inputs and outputs and its key role in shaping American social welfare programs.
- 332. *Social Welfare Policy and Services II.* 2 hr. Develops knowledge and skill in the range of analytic tools and their effective use for policy formation, implementation, realignment, and planning futuristic alternatives. Determining policy objectives, acquiring social intelligence and indicators, and the dilemmas of decision theory and practice.
- 340. *Introduction to Social Work Practice.* 5 hr. Basic concepts underlying generic social work practice. Introduction to practice skills is provided: a. Helping individuals, families, and small groups; b. Community development, planning and organizing; c. Management and administration.
- 341. *Practice Affecting Individuals, Families, and Small Groups.* 2 hr. The restoration, maintenance, or enhancement of social functioning of individuals, families, and small groups utilizing methodological approaches — both old and new.

351. *Practice Affecting Organizations, Institutions, and Communities.* 2 hr. Students develop knowledge and skill in enhancing the functioning of a variety of social systems; task group, neighborhood, community (rural and urban), and organization.
375. *Individual Consultation.* 1-3 hr. PR: Consent. Individual directed study to develop extensive knowledge in a social work area of student interest.
- 380-1. *Seminar in Manpower: Problems, Policy, Programs.* Student may select some problem, policies, and programs in manpower employment for in-depth study. Focus on appropriate social work interventions for personal change or community development in Appalachian region.
- 380-2. *Social Work Practice As Affected by Racism and Cultural Diversity.* 1-6 hr. An examination of practice implications wherein worker and client are from diverse ethnic and/or sociocultural backgrounds. Ways of reducing the barriers which may exist are explored and solutions are reviewed.
- 380-3. *Women's Studies.* 1-6 hr.
- 380-4. *Staff Development and Training.* 1-6 hr.
- 380-5. *Seminar on Drugs: Implications for Social Work Practice.* 1-6 hr. Acquaints students with the history and nature of drug usage in modern society; current definitions of drug usage: medical, psychological, law enforcement, socio-cultural; range and kinds of treatment resources and gaps in these resources; examine and understand the practice dilemmas posed by drug problems for social work interventions.
381. *Field Instruction I.* 5-14 hr. Field instruction and practice in selected settings under general direction of the faculty.
421. *Human Behavior and the Social Environment III.* 2 hr. The understanding of behavior is extended by review of previous materials and their application to experiences from field work. Student projects facilitate the integration of materials from different curriculum areas.
431. *Social Welfare Policy and Services III.* 2 hr. Emphasis on further developing skills in policy analysis. Specific policy issues are selected for intensive, comprehensive study, building on knowledge and skills gained from S.W. 331-332.
441. *Advanced Practice Affecting Individuals, Families, and Small Groups.* 3 hr. A seminar format dealing with variety of student needs. Emphasizes the student's style of helping as gleaned from exposure to various methodologies and field instruction experience.
451. *Practice in Advanced Planning and Social Development Strategies.* 3 hr. A study of planning techniques for selected programs, i.e. housing, health; accompanied by appropriate structuring of organizations to implement planning; and theories of social development and effective social action.
460. *Social Work Management.* 3 hr. An intensive examination of the concepts, principles and skills of administration, consultation, supervision, and teaching in social work practice.
- 480-1. *Seminar in Social Work Practice With Task Action Groups.* 1-6 hr. A seminar which permits skill development in work with agency boards, community advisory committees, autonomous community self/help or action groups, staff committees, planning groups or bodies.
- 480-2. *Criminal Victimization and Social Work Practice.* 1-6 hr. A social, psychological, and legal introduction to victimization and victimology; skills in helping process victims through the justice system; victim prevention and treatment policies and programs.

- 480-3. *Professional Writing for Social Workers*. 2 hr. Functions and responsibilities of article writing and publishing, manuscript analysis, and editorial decision factors. Students are required to produce, edit, and publish the schools' journal. *Social Welfare in Appalachia*.
- 480-4. *Sexual Problems and Social Work Practice*. 1-6 hr. Teaches skills in diagnosing and treating sexual dysfunctions and policy analytic skills around such policies as sex education, contraception, alternate sexual life styles, and sex offenders.
- 480-5. *Child Development Services and Issues*. 2 hr. Provides students with an in-depth study of current issues and practices in child development social services: day care, protective services, foster care, public school services, etc.
- 480-6. *Service Planning for the Aged*. 2 hr. Application of planning models to needs and services with aged groups, legislation and service systems.
- 480-7. *Deviance Theory and Social Work*. 2 hr. Critical analysis of deviance theory and its ethical basis as applied to mental health and criminal justice systems.
- 480-8. *Community Mental Health Issues*. 2 hr. Analyzes the shift from institutions to community approaches and the evaluation of community health programs.
- 480-9. *Applied Research in Community Mental Health*. 2 hr. Focuses on the enhancement of research skills for use in mental health settings, with emphasis on computer science.
- 480-10. *Minority Victimization*. 2 hr. Practicy, policy, and alternatives with American minorities — racism, sexism, age-ism, and hetero-sexualism.
481. *Advanced Field Instruction II*. 5-14 hr.
497. *Introduction to Social Research Methods*. 3 hr. Basic concepts in social research methods. Emphasis on conceptualization of social work problems for research, role of social science theories in research, measurement, options in research design, and analysis of data.
- 497-1. *Introduction to Statistics*. 3 hr. Descriptive and inferential statistics and their application to practice problems. Analytic techniques include non-parametric and parametric statistics through the analysis of variance. Laboratory exercises designed to simulate practice problems.
- 497-2. *Survey Design and Analysis*. 3 hr. Seminar covers basic designs in quantitative-descriptive research, sample design, and computerized social data analysis using the Data-Text System. Seminars alternated with laboratory sessions. Students encouraged to generate their own data for analysis.
- 497-3. *Principles of Program Design and Evaluation*. 3 hr. Application of research methods to design of experimental social programs and their evaluation. Students design an experimental social program.
- 497-4. *Research Methodology in Community and Organizational Studies*. 3 hr. Seminar covers research strategies and methodological problems related to the organization and delivery of services at the community level. Particular emphasis on the social problems, organizational and administrative patterns, decision-making structures, and the like.
- 497-5. *Special Topics*. 1-6 hr. Provides a variety of special arrangements with students, as individuals or in small groups, such as tutorials, the implementation of research projects, and the like. Admission by permission of the research faculty.
- 497-6. *Research Utilization*. 3 hr. A seminar devoted to a critical analysis of contemporary research in the social sciences and in social welfare as this relates to social work practice.



Part 5

GRADUATE FACULTY

Ex officio members: the president, the provosts, and deans of the various colleges and schools.

An asterisk (*) following a name designates Associate Member of the Graduate Faculty.

COLLEGE OF AGRICULTURE AND FORESTRY

Interdivisional Committee of Agricultural Biochemistry

David A. Stelzig, Ph.D. (N.D. St. U.), *Associate Professor of Agricultural Biochemistry; Chairman.*

Bradford C. Bearce, Ph.D. (U. Calif.), *Associate Professor of Horticulture and Agricultural Biochemistry.*

James L. Brooks, Ph.D. (U. Calif.), *Associate Professor of Agricultural Biochemistry.*

Morris Ingle, Ph.D. (Purdue U.), *Professor of Horticulture and Agricultural Biochemistry.*

Walter J. Kaczmarczyk, Ph.D. (Hahnemann Med. C.), *Associate Professor of Genetics and Agricultural Biochemistry.*

George A. McLaren, Ph.D. (Okla. St. U.), *Professor of Nutritional Biochemistry.*

William G. Martin, Ph.D. (WVU), *Professor of Agricultural Biochemistry.*

Homer Patrick, Ph.D. (Penn. St. U.), *Professor of Agricultural Biochemistry.*

Robert L. Reid, Ph.D. (Aberdeen U.), *Professor of Animal Nutrition and Agricultural Biochemistry.*

Eion G. Scott, Ph.D. (U. Calif.), *Professor of Horticulture and Agricultural Biochemistry.*

Valentin Ulrich, Ph.D. (Rutgers U.), *Professor of Genetics and Agricultural Biochemistry.*

Division of Animal and Veterinary Sciences

Alfred L. Barr, Ph.D. (Okla. St. U.), *Professor of Agricultural Economics, Chairman.*

Gerald C. Anderson, Ph.D. (U. Mo.), *Professor of Animal Science.*

Leslie Dozsa, D.V.M. (C. Vet. Med., Budapest), *Professor of Veterinary Science.*

Robert S. Dunbar, Jr., Ph.D. (Cornell U.), *Professor of Animal Science.*

Donald J. Horvath, Ph.D. (Cornell U.), *Professor of Animal Science.*

E. Keith Inskeep, Ph.D. (U. Wisc.), *Professor of Animal Science.*

Robert O. Kelley, Ph.D. (U. Mo.), *Associate Professor and State Extension Specialist — Dairy Science.*

Harold E. Kidder, Ph.D. (U. Wisc.), *Professor of Animal Science.*

Marvin R. McClung, Ph.D. (Iowa St. U.), *Professor of Animal Science.*

George A. McLaren, Ph.D. (Okla. St. U.), *Professor of Nutritional Biochemistry.*

William G. Martin, Ph.D. (WVU), *Professor of Agricultural Biochemistry.*

Norman O. Olson, D.V.M. (Wash. St. U.), *Professor of Veterinary Science.*

Homer Patrick, Ph.D. (Penn. St. U.), *Professor of Agricultural Biochemistry.*

John B. Peters, Ph.D. (U. Wisc.), *Associate Professor of Animal Science.*

Ronald A. Peterson, Ph.D. (Mich. St. U.), *Associate Professor of Poultry Science.*

Robert L. Reid, Ph.D. (Aberdeen U.), *Professor of Animal Science.*

John R. Schabinger, Ph.D. (N.C. St. U.), *Professor and Area Extension Specialist — Dairy Science.*

Roy O. Thomas, Ph.D. (Mich. St. U.), *Associate Professor of Dairy Science.*

William V. Thayne,* Ph.D. (U. Ill.), *Assistant Professor of Animal Science.*
 Benjamin W. Wamsley, Jr.,* M.S. (WVU), *Associate Professor and State Extension Specialist — Animal Science.*
 James A. Welch, Ph.D. (U. Ill.), *Professor of Animal Science.*
 Frank E. Woodson, D.V.M. (Ohio St. U.), *Professor of Veterinary Science.*

Division of Forestry

David E. White, Ph.D. (SUNY), *Professor of Forest Economics, Chairman.*
 Samuel M. Brock, Ph.D. (U. Minn.), *Associate Professor of Forest Economics.*
 Kenneth L. Carvell, D.F. (Duke U.), *Professor of Silviculture.*
 Franklin C. Cech, Ph.D. (Tex. A&M U.), *Professor of Forest Genetics.*
 John D. Gill,* M.S. (Mich. St. U.), *Assistant Professor of Wildlife Management.*
 William H. Goudy,* M.S. (Mich. St. U.), *Assistant Professor of Wildlife Management.*
 John R. Hamilton, Ph.D. (N.C. St. U.), *Professor of Wood Science.*
 Joseph M. Hutchison, Jr.,* M.S. (WVU), *Associate Professor of Recreation.*
 Norman D. Jackson,* M.W.T. (N.C. St. U.), *Assistant to the Chairman, Associate Professor of Wood Science.*
 Etley P. Jenkins,* M.S. (WVU), *Assistant Professor of Wood Science.*
 Christian E. Koch, Ph.D. (U. Mich.), *Professor of Wood Science.*
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African Studies

- Vance Q. Alvis, Ph.D. (U. Va.), *Professor of Economics.*
- Gerald C. Anderson, Ph.D. (U. Mo.), *Professor of Animal Science.*
- Wesley M. Bagby, Ph.D. (Columbia U.), *Professor of History.*
- Newton M. Baughman, Ph.D. (Purdue U.), *Director, International Programs; Professor of Agronomy; Co-Chairman, African Studies.*
- Philip Bordinat, Ph.D. (U. Birmingham, England), *Professor of English.*
- Thomas C. Campbell, Jr., Ph.D. (U. Fla.), *Professor of Economics.*
- Robert Davis,* M.A. (Ariz. St. U.), *Assistant Professor of Geography.*
- Robert S. Dunbar, Jr., Ph.D. (Cornell U.), *Professor of Animal Science.*
- Homer C. Evans, Ph.D. (U. Minn.), *Acting Dean, College of Agriculture and Forestry; Acting Director, Agricultural Experiment Station; Professor of Agricultural Economics.*
- Philip J. Faini,* M.M. (WVU), *Associate Professor of Music.*
- Mannon E. Gallegly, Ph.D. (U. Wisc.), *Director, Division of Plant Sciences; Professor of Plant Pathology.*
- Harold A. Gibbard, Ph.D. (U. Mich.), *Professor of Sociology; Assistant to the Provost for Instruction.*
- Leon H. Ginsberg, Ph.D. (U. Okla.), *Dean, School of Social Work; Professor of Social Work.*
- Henry W. Hurlbutt, Jr., Ph.D. (U. Md.), *Associate Professor of Biology.*
- A. D. Longhouse, Ph.D. (Cornell U.), *Chairman and Professor of Agricultural Engineering.*
- Marvin R. McClung, Ph.D. (Iowa St. U.), *Professor of Animal Science.*
- Robert M. Maxon,* Ph.D. (Syracuse U.), *Associate Professor of History.*
- Robert F. Munn, Ph.D. (U. Mich.), *Director of Libraries; Chairman and Professor of Library Science.*
- Ralph E. Nelson, Ph.D. (U. Minn.), *Provost for Off-Campus Education; Professor of Agricultural Economics.*
- Ernest J. Nesius, Ph.D. (Iowa St. U.), *Benedum Professor of Agricultural Economics.*
- Franklin Parker, Ed.D. (Geo. Peabody C.), *Benedum Professor of Education.*
- Willem A. van Eck, Ph.D. (Mich. St. U.), *Professor of Soil Science.*
- James A. Welch, Ph.D. (U. Ill.), *Professor of Animal Science.*
- Rodger D. Yeager, Ph.D. (Syracuse U.), *Associate Professor of Political Science; Co-Chairman, African Studies.*

Faculty of Genetics—Developmental Biology

- David F. Blaydes, Ph.D. (Ind. U.), *Associate Professor of Biology.*
- Donald F. Butcher, Ph.D. (Iowa St. U.), *Professor of Statistics.*
- Roy L. Butcher, Ph.D. (Iowa St. U.), *Assistant Professor of Obstetrics and Gynecology; Associate Professor of Anatomy.*
- Linda Butler, Ph.D. (U. Ga.), *Associate Professor of Entomology.*
- Franklin C. Cech, Ph.D. (Tex. A&M U.), *Professor of Forest Genetics.*
- John S. Ellingson, Ph.D. (U. Mich.), *Assistant Professor of Biochemistry.*
- Vincent F. Gerencser, Ph.D. (U. Ky.), *Associate Professor of Microbiology.*
- John E. Hall, Ph.D. (Purdue U.), *Professor of Microbiology.*
- Barbara Jones, M.D. (U. Utah), *Professor of Pediatrics.*
- Walter J. Kaczmarczyk, Ph.D. (Hahnemann Med. C.), *Associate Professor of Genetics.*
- Sam Katz, Ph.D. (Northwestern U.), *Associate Professor of Biochemistry.*

Edward C. Keller, Jr. Ph.D. (Penn. St. U.), *Professor of Biology*.
 Billy E. Kirk, Ph.D. (Ohio St. U.), *Associate Professor of Microbiology*.
 Robert E. McCafferty, Ph.D. (U. Pitt.), *Professor of Anatomy; Research Associate in Obstetrics and Gynecology*.
 Marvin R. McClung, Ph.D. (Iowa St. U.), *Professor of Animal and Veterinary Science*.
 Henry F. Mengoli, Ph.D. (Cath. U. Am.), *Assistant Professor of Microbiology; Research Associate in Pathology*.
 Ethel C. Montiegel,* M.S. (WVU), *Associate Professor of Biology*.
 Joginder Nath, Ph.D. (U. Wisc.), *Professor of Genetics*.
 Oliver M. Neal, Ph.D. (Mich. St. U.), *Professor of Horticulture*.
 Dennis O. Overmann, Ph.D. (U. Mich.), *Assistant Professor of Anatomy*.
 Robert S. Pore, Ph.D. (U. Calif.), *Associate Professor of Microbiology*.
 Randall W. Reyer, Ph.D. (Yale U.), *Professor of Anatomy*.
 William V. Thayne,* Ph.D. (U. Ill.), *Assistant Professor of Statistics*.
 Havelock Thompson, M.D. (U. Colo.), *Associate Professor of Pediatrics*.
 George P. Tryfiates, Ph.D. (Rutgers U.), *Associate Professor of Biochemistry*.
 Valentin Ulrich, Ph.D. (Rutgers U.), *Professor of Genetics*.
 Knox Van Dyke, Ph.D. (St. Louis U.), *Associate Professor of Pharmacology*.
 Stanley Wearden, Ph.D. (Cornell U.), *Professor of Statistics; Dean, Graduate School*.
 Leah A. Williams,* Ph.D. (WVU), *Associate Professor of Biology*.

Faculty of Reproductive Physiology

Gerald C. Anderson, Ph.D. (U. Mo.), *Professor of Animal Science*.
 Walter A. Bonney, Jr., M.D. (Columbia U.), *Professor of Obstetrics and Gynecology*.
 Roy L. Butcher, Ph.D. (Iowa St. U.), *Assistant Professor of Obstetrics and Gynecology*.
 Richard J. Cenedella, Ph.D. (Jefferson Med. C.), *Associate Professor of Pharmacology*.
 William E. Collins, Ph.D. (U. Wisc.), *Professor of Biology*.
 Nicholas W. Fugo,* Ph.D. (St. U. Iowa), M.D. (U. Chicago), *Professor of Obstetrics and Gynecology*.
 Donald J. Horvath, Ph.D. (Cornell U.), *Professor of Animal Science*.
 E. Keith Inskeep, Ph.D. (U. Wisc.), *Professor of Animal Science*.
 John E. Jones,* M.D. (U. Utah), *Professor of Medicine; Dean, School of Medicine*.
 Harold E. Kidder, Ph.D. (U. Wisc.), *Professor of Animal Science*.
 Robert D. McCafferty, Ph.D. (U. Pitt.), *Professor of Anatomy*.
 Michael G. Mawhinney, Ph.D. (WVU), *Assistant Professor of Pharmacology and Urology*.
 Walter H. Moran, Jr., M.D. (Harvard U.), *Professor of Surgery*.
 Joginder Nath, Ph.D. (U. Wisc.), *Professor of Genetics*.
 Ronald A. Peterson, Ph.D. (Mich. St. U.), *Associate Professor of Animal Science*.
 John A. Thomas, Ph.D. (St. U. Iowa), *Professor of Pharmacology*.
 James A. Welch, Ph.D. (U. Ill.), *Professor of Animal Science*.

Part 6

SCHOOL OF DENTISTRY

The School of Dentistry was established by an act of the West Virginia Legislature on March 9, 1951, and the first class began studies in September, 1957. The twenty-three members of that class were graduated in 1961, receiving the first dental degrees awarded in West Virginia. More than two hundred students are now enrolled in the four-year accredited dental program. In September, 1961, the first students were enrolled in the school's degree program in dental hygiene and were graduated in 1965.

The profession of dentistry offers many career opportunities. In addition to the general practice of dentistry, specialty practice areas may be pursued by further study. The fields of dental education and research provide the opportunity for satisfying and interesting careers. Dental auxiliary careers such as dental hygiene may be pursued. Men and women entering the dental health care delivery system find that they play an important role in the exciting and challenging world of the modern health sciences.

The School of Dentistry of West Virginia University offers programs of education leading to the degrees of Doctor of Dental Surgery, Master of Science with a major in Orthodontics, and Bachelor of Science in Dental Hygiene. (See Dental Hygiene in the *WVU Undergraduate Catalog*.) One Oral Surgery internship and two Oral Surgery residencies are offered by the Department of Oral Surgery. Programs leading to the Master of Science and Doctor of Philosophy degrees are available in the associated basic sciences. Two general practice residencies are offered by the School of Dentistry and University Hospital. Continuing education courses for dentists and auxiliaries are offered throughout the year on a wide variety of dental topics.

Administration of the School of Dentistry is the responsibility of the Dean. He is aided in this function by an associate dean, two assistant deans, and the clinical and basic sciences chairpersons. This administrative group, the Faculty Council, serves in an advisory capacity to the Dean in carrying out the established policies of the School of Dentistry and of WVU.

Faculty

John D. Adams, D.D.S. (U. Pitt.), *Professor and Chairman of Fixed Prosthodontics.*

Camillo A. Alberico, D.D.S. (Marquette U.), *Assistant Dean; Professor and Chairman of Endodontics.*

Edward Atkins, D.D.S. (WVU), *Instructor (part-time) in Crown and Bridge Dentistry.*

Frank S. Balaban, D.D.S. (WVU), *Instructor in Periodontics.*

Henry J. Bianco, D.D.S. (U. Md.), *Professor and Chairman of Prosthodontics.*

W. Robert Biddington, D.D.S. (U. Md.), *Dean; Professor of Endodontics.*

Mary Lynn Bogard, B.S. (WVU), *Instructor in Dental Hygiene.*

Emmett F. Brown, D.D.S. (U. Pitt.), *Professor of Dental Auxiliary Utilization.*

John L. Campbell, D.D.S. (Ind. U.), *Professor and Chairman of Oral Surgery.*

Minter L. Chapman, D.D.S. (WVU), *Assistant Professor (part-time) of Operative Dentistry.*

Geoffrey W. Christian, D.D.S. (WVU), *Instructor (part-time) in Prosthodontics.*

William C. Clark, D.D.S. (WVU), *Instructor (part-time) in Endodontics.*

Thomas Condron, D.D.S. (WVU), *Instructor in Operative Dentistry.*

Donald Davidson, D.D.S. (U. Buffalo), *Special Lecturer in Oral Surgery.*

Leo DeCounter, D.D.S. (U. Iowa), *Associate Professor of Prosthodontics.*
 John Dempsey, D.D.S. (U. Md.), *Assistant Professor (part-time) of Orthodontics.*
 Adelmo DeNapoli, D.D.S. (Ohio St. U.), *Special Lecturer in Prosthodontics.*
 Patrick Farace, D.D.S. (Northwestern U.), *Associate Professor of Operative Dentistry.*
 James R. Foor, D.D.S. (WVU), *Instructor in Operative Dentistry.*
 John W. Frye, D.D.S. (WVU), *Assistant Professor (part-time) of Operative Dentistry.*
 Lawrence Gaston, D.D.S. (WVU), *Assistant Professor of Orthodontics.*
 Calvin Gaver, D.D.S. (U. Md.), *Associate Professor of Operative Dentistry.*
 John E. Glover, D.D.S. (WVU), *Instructor (part-time) in Prosthodontics.*
 William L. Graham, D.D.S. (U. Md.), *Assistant Dean; Professor and Chairman of Oral
Diagnosis and Roentgenology.*
 Robert W. Graves, D.D.S. (WVU), *Associate Professor of Oral Surgery.*
 James A. Griffin, D.D.S. (Baylor U.), *Associate Professor of Endodontics.*
 Geoffrey Gwynn, D.D.S. (WVU), *Instructor (part-time) in Pedodontics.*
 John M. Holovak, D.D.S. (WVU), *Instructor in Prosthodontics.*
 Mary Beiswenger Holovak, B.S. (U. Buffalo), *Instructor in Dental Hygiene.*
 John W. Howard, A.M. (U. Mich.), *Professor of Dental Literature.*
 William G. Hutchinson, D.M.D. (U. Ore.), *Associate Professor of Operative Dentistry.*
 David C. Johnsen, D.D.S. (U. Mich.), *Assistant Professor of Pedodontics.*
 Theodore Kaduk, D.D.S. (WVU), *Instructor in Oral Diagnosis.*
 Richard Kelly, D.D.S. (WVU), *Instructor (part-time) in Operative Dentistry.*
 Ordie H. King, Jr., D.D.S., Ph.D. (U. Tenn.), *Professor of Oral Pathology.*
 Stephen Kwiatkowski, D.D.S. (WVU), *Assistant Professor of Crown and Bridge Dentistry.*
 Raymond Ladwig, D.D.S. (WVU), *Assistant Professor of Crown and Bridge Dentistry.*
 Robert Layman, D.D.S. (WVU), *Instructor in Operative Dentistry.*
 Clarence R. McCurdy, D.D.S. (WVU), *Associate Professor of Crown and Bridge Dentistry.*
 William R. McCutcheon, D.D.S. (WVU), *Associate Professor of Public Health Dentistry.*
 Hubert E. Martin, D.D.S. (U. Pitt.), *Assistant Professor (part-time) of Orthodontics.*
 William W. Merow, D.D.S. (U. Md.), *Professor and Chairman of Orthodontics.*
 Carolyn Miller, B.S. (WVU), *Instructor in Dental Hygiene.*
 Donald Morrison, D.D.S. (U. Iowa), *Associate Professor and Chairman of Periodontics.*
 David Nash, D.M.D. (U. Ky.), *Associate Professor and Chairman of Pedodontics.*
 Gary Naylor, D.D.S. (WVU), *Instructor (part-time) in Operative Dentistry.*
 Franklin Oliverio, D.D.S. (U. Md.), *Assistant Professor (part-time) of Oral Surgery.*
 James E. Overberger, D.D.S. (U. Pitt.), *Associate Dean; Professor of Dental Materials.*
 William G. Pringle, D.D.S. (WVU), *Assistant Professor (part-time) of Orthodontics.*
 David T. Puderbaugh, D.D.S. (WVU), *Associate Professor of Operative Dentistry.*
 Nancy V. Ramsey, M.S. (U. Mich.), *Director and Associate Professor of Dental Hygiene.*
 Harold H. Reed, D.D.S. (WVU), *Instructor (part-time) in Operative Dentistry.*
 Sterling Ronk, D.D.S. (WVU), *Instructor in Pedodontics.*
 John Ruby, D.D.S. (U. Penn.), *Instructor (part-time) in Pedodontics.*
 Robert E. Sausen, D.D.S. (U. Minn.), *Professor and Chairman of Operative Dentistry.*
 Ann Shoaf, B.S. (WVU), *Assistant Professor of Dental Hygiene.*
 Clifford J. Shuman, D.D.S. (WVU), *Assistant Professor (part-time) of Endodontics.*
 A. Eddy Skidmore, D.D.S. (WVU), *Assistant Professor of Endodontics.*
 Homer Smith, D.D.S. (WVU), *Assistant Professor of Oral Diagnosis.*
 Keith Smith, D.D.S. (WVU), *Instructor in Crown and Bridge Dentistry.*
 Charles Somers, D.D.S. (Loyola U.), *Professor of Prosthodontics.*
 James G. Thomas, D.D.S. (Temple U.), *Associate Professor of Oral Diagnosis and
Roentgenology.*
 Harold E. Tucker, D.D.S. (Med. C. Va.), *Associate Professor of Crown and Bridge
Dentistry.*

Alfred VanRiper, D.D.S. (WVU), *Associate Professor (part-time) of Prosthodontics.*
David Walker, D.D.S. (WVU), *Instructor in Operative Dentistry.*
David A. Wallace, D.D.S. (WVU), *Special Lecturer in Oral Surgery.*
Robert Wanker, D.D.S. (WVU), *Instructor (part-time) in Periodontics.*
Edward Watson, D.D.S. (WVU), *Special Lecturer in Orthodontics.*
John T. Welch, D.D.S. (U. Md.), *Professor of Oral Surgery.*
John B. Wilfong, D.D.S. (WVU), *Assistant Professor (part-time) of Orthodontics.*
Donald Willett, D.D.S. (WVU), *Instructor in Prosthodontics.*
Thomas Witzemberger, D.D.S. (WVU), *Instructor in Periodontics.*
John Wright, D.D.S. (WVU), *Instructor in Operative Dentistry.*

DOCTOR OF DENTAL SURGERY PROGRAM

The School of Dentistry offers a program of education leading to the degree of Doctor of Dental Surgery (D.D.S.). The requirements for admission and the curriculum conform to the standards established by the Council on Dental Education of the American Dental Association.

Admission

The School of Dentistry participates in the American Association of Dental Schools Application Service. All applications are processed by that organization. Application request cards and additional required materials are available at the Office of Admissions and Records, 1170 Basic Sciences Building, WVU Medical Center, Morgantown, WV 26506.

Because of the large number of applicants and limited openings available, preference in admissions is given to qualified West Virginians although outstanding nonresident applicants will be considered. Nonresident applicants should have a grade-point average of 3.0 or above and an average score on the Academic and PMAT sections of the Dental Admission Test of at least 4-4. Careful consideration is given to those personal qualifications which bear upon fitness of applicants for the study and practice of the profession. Economically or culturally disadvantaged students (especially if they are state residents) are encouraged to apply. Applications from women also are encouraged.

Application for admission in the Fall, 1976, should be made promptly upon completion of the 1974-75 school year, even if the applicant has not completed all the requirements as listed. Final acceptance of a student is contingent upon satisfactory completion of all requirements. The deadline for applications is Dec. 1, 1975 (flexible). Applications must be submitted to the American Association of Dental Schools Application Service by Nov. 1, 1975, so that all required supplemental materials may be received by WVU by the Dec. 1, 1975, deadline. Applicants not filing early, as well as applicants who do not have *all* of the necessary credentials (e.g. DAT scores, final transcripts, and letters of recommendation) at the time of applying for admission, lessen their opportunity for acceptance since the Admissions Committee begins its consideration of candidates as soon as applications are received.

Each applicant is required to satisfactorily complete the Dental Admission Test. It is suggested that the test be taken in April, 1975, before making application in June, 1975, for admission in the Fall of 1976. Other testing periods are acceptable. This test is given at testing centers throughout the United States and its possessions, and in Canada. Application cards may be secured by writing to: Division of Testing, Council on Dental Education, 211 E. Chicago Avenue, Chicago, IL 60611.

Applicants for admission must present evidence of having successfully completed three or more academic years of work in liberal arts in an accredited college. The prerequisite courses should include:

	<i>Sem. Hr.</i>
English Composition and Rhetoric or equivalent.....	6
Zoology or Biology (with laboratory)	8
Inorganic Chemistry (with laboratory).....	8
Organic Chemistry (with laboratory).....	8
Physics (with laboratory).....	8

Courses in comparative anatomy, embryology, and biochemistry are strongly recommended. In addition, courses in the humanities and the social sciences are suggested in order to acquire a broadened intellectual background for both the study and practice of dentistry.

Applicants who have complied with all preliminary requirements for admission are required to appear for a personal interview. The Committee on Admissions will advise the applicants of the time and place of the interview.

Good physical and mental health are essential for the successful study and practice of dentistry. Good eyesight is particularly important. The applicant admitted to the School of Dentistry must present, on or before the day of enrollment, a certificate from an examining doctor stating the condition of the applicant's eyes. If any correctible defects in vision exist, evidence shall be presented to show that proper corrections have been made: All students are required to have protective glasses in performing clinical and/or dental laboratory procedures. Students who wear corrective glasses will meet the safety requirements, but those students who do not require correction should be fitted by an ophthalmologist, optometrist, or optician with safety or non-corrective glasses. Safety shield glasses or goggles are not acceptable.

It is required that during the first semester of the first year all students must complete certain prescribed immunization and diagnostic procedures.

Promotion

At the close of the school year, the status of each student is reviewed by the appropriate academic standards committee, which then reports to the Dean and the Faculty Council. The committee may recommend that a student be promoted unconditionally, be promoted on probation, be allowed to make up deficiencies, be given the opportunity to repeat a year, or be suspended from further studies in the School of Dentistry. Final disposition in each case is the prerogative of the Dean and the Faculty Council.

Unconditional promotion normally depends upon the fulfillment of all course requirements, and the attainment of certain minimum standards of academic achievement. These requirements provide for a minimum grade-point average of 1.5 for promotion to the second year; for a minimum cumulative grade-point average of 1.75 for promotion to the third year; for a minimum cumulative grade-point average of 2.0 for promotion to the fourth year; and for a cumulative grade-point average of 2.0 for graduation. Outstanding students may be considered for graduation upon completion of the third summer session.

Requirements for Degree

Candidates for graduation are recommended by the faculty of the School of Dentistry to the Board of Regents for its approval and for the conferring of the degree of Doctor of Dental Surgery, provided they meet fully the following conditions:

1. Shall have been in regular attendance in the School of Dentistry for the academic period prescribed for each student.

2. Shall have completed the prescribed curriculum for each of the academic sessions.

3. Shall have shown good moral character and shall have demonstrated a sense of professional responsibility in the performance of all assignments as a student.

4. Shall have met in full all financial obligations to the University.

Attendance at the spring Commencement is voluntary. If you don't plan to attend, leave the complete mailing address to where you want your diploma mailed at the Dean's office.

Curriculum

The continual change in the social, economic, and educational structure of our society has led to an acute awareness of personal health needs. Foremost among these changes are the population explosion, rapidity of communication, and increased life expectancies.

The School of Dentistry recognizes its obligation to produce professionals capable of meeting the dental health needs of society and providing leadership for the dental profession. Therefore, the school offers a curriculum that will provide students with a learning environment in which to develop the technical competence, intellectual capability, and professional responsibility necessary to meet the dental health needs of a society in a state of constant transformation. In order to insure the achievement of these goals, the dental curriculum is continually reviewed and revised.

The basic required courses are presented during the first 33 academic months of the curriculum. Student progress is constantly evaluated. Upon completion of the second semester of the third year of the program, the progress of all students is thoroughly reviewed by the faculty and individual curriculums for completion of the program are designed for each student. Students must complete satisfactorily all courses attempted. Outstanding students may be considered for graduation upon completion of the third summer session.

The student has the opportunity in the second semester of the first year for early experience to patient oriented instruction through the introduction to preventive dentistry, community health, oral diagnostic techniques, and the concepts of comprehensive dental care.

It is recognized that dental students have a wide variety of interests and backgrounds. To stimulate, motivate, and satisfy these interests, elective opportunities are offered in the first and second semesters of the fourth year of the curriculum. The relationship of the number of elective and/or required hours during the fourth year may vary with each student depending on the individual student's progress at the completion of the third summer session and/or first semester of the fourth year.

SCHOOL OF DENTISTRY CURRICULUM PLAN

	First Year (1,200 hr.)	Summer Session (320 hr.)	Second Year (1,200 hr.)	Summer Session (320 hr.)	Third Year (1,200 hr.)	Summer Session (320 hr.)	Fourth Year (1,200 hr.)
		Basic	Basic	Basic Dental Science	Basic Biologic Science	Bio-Clin. Sci. P.D. & C.H.	
100		Dental	Biologic	Bio-Clinical Sciences		Clinical	
	Basic	Science	Science	P.D. & C.H.		Dentistry	
200					Bio-		Electives
	Biologic	Bio-Clinical Sciences		Clinical Dentistry	Clinical		and
300	Science	Clinical Dentistry	Basic		Sciences	Unscheduled Time	Clinical
		Unsched.		Unsched.			Dentistry
400			Dental		Prev. Dent. & Comm. Hlth.		
			Science				
500							
600	Basic		Bio-				
	Dental		Clinical		Clinical		
700	Science		Sciences				
800					Dentistry		
			Prev. Dent. & Comm. Hlth.				
900	Bio-Clinical Sciences						
	Prev. Dent. & Comm. Hlth.		Clinical				
1,000	Clinical Dentistry		Dentistry				
							Unscheduled Time
1,100	Unscheduled Time		Unscheduled Time		Unscheduled Time		
1,200							

SCHOOL OF DENTISTRY COURSE SCHEDULE

	First Semester	Second Semester	Summer
FIRST YEAR			
300 — Anesthesiology			x
303 — Oral Diagnostic Techniques		x	
304 — Operative Dentistry (1)		x	
305 — Biochemistry		x	
306 — Cross Anatomy (Trunk & Extremities)	x		
307 — Cross Anatomy of Head and Neck Neuroanatomy		x	
309 — Microanatomy and Organalogy	x		
310 — Dental Anatomy and Occlusion	x		
311 — Periodontics (1)	x		
312 — Dental Materials	x		
313 — Removable Prosthodontics (1)	x		
314 — Fixed Prosthodontics (1)			x
315 — Prev. Dent. and Comm. Health (1)	x	x	
316 — Removable Prosthodontics (2)			x
318 — Oral Histology and Embryology		x	
320 — Prev. Dent. and Comm. Health (2)		x	
321 — Endodontics (1)			x
322 — Operative Dentistry (2)			x
323 — Clinic: Orientation			x
SECOND YEAR			
302 — Microbiology	x		
325 — Auxiliary Utilization (1)		x	x
327 — Oral Roentgenology	x		
328 — General Pathology	x		
329 — Operative Dentistry	x	x	
330 — Prev. Dent. and Comm. Health (3)		x	
332 — Prev. Dent. and Comm. Health (4)			x
333 — Physical Diagnosis		x	
334 — Removal Prosthodontics (3)		x	
335 — Pedodontics (1)	x	x	x
336 — Fixed Prosthodontics (2)	x	x	
337 — Oral Diagnosis (1)		x	x
338 — Oral Pathology		x	
339 — Oral Surgery (1)		x	x
340 — Periodontics (2)	x	x	x
341 — Removable Prosthodontics (4)			x
342 — Endodontics (2)		x	x
343 — Fundamentals of Physiology	x		
345 — Principles of Orthodontics		x	
346 — Orthodontics Technics			x
348 — Operative Dentistry (4)			x
THIRD YEAR			
350 — Removable Prosthodontics (5)	x	x	x
352 — Prev. Dent. and Comm. Health (5)	x	x	
353 — Oral Oncology	x		
354 — Prev. Dent. and Comm. Health (6)			x
355 — Clinical Path. Correlation Conference		x	
357 — Fixed Prosthodontics (3)	x	x	x
358 — Operative Dentistry (5)	x	x	x
359 — Oral Surgery (2)	x	x	x
360 — Pharmacology	x		
361 — Pedodontics (3)	x	x	x
362 — Endodontics (3)	x	x	x
363 — Periodontics (3)	x	x	x
364 — Oral Diagnosis (2)	x	x	x
365 — Clinical Orthodontics (1)	x	x	x
367 — Clinical Oral Roentgenology (1)	x	x	x
371 — Auxiliary Utilization (2)	x	x	x
FOURTH YEAR			
375 — Auxiliary Utilization	x	x	
376 — Removable Prosthodontics	x	x	
377 — Periodontics	x	x	
380 — Endodontics	x	x	
382 — Clinic — Pathologic Correlation Conference	x	x	
383 — Operative Dentistry	x	x	
384 — Oral Surgery	x	x	
385 — Clinical Orthodontics	x	x	
386 — Pedodontics	x	x	
387 — Oral Diagnosis	x	x	
389 — Fixed Prosthodontics	x	x	
394 — Prev. Dent. and Comm. Health	x	x	
396 — Clinical Oral Roentgenology	x	x	
397 — Special Topics*			

*The relationship of the number of elective and/or required hours during the fourth year may vary with each student depending on the individual student's progress at the completion of the third summer session and/or first semester of the fourth year.

Dental Clinic

Clinical training and experience constitute a major part of the curriculum for dental and dental hygiene students. Facilities for dental and dental hygiene students include 160 treatment cubicles and all necessary related laboratories. Patients are accepted for treatment if their dental problems are of teaching value and if a student is available for assignment. The student assigned to each patient must work under close supervision of a faculty member. The clinic program provides practical experience for the student and renders a much needed service to several thousand patients annually.

Books and Instruments

Dental students are required to obtain necessary textbooks for the scheduled courses and special instruments for use in the various laboratories and clinics. Lists of approved instruments and books will be provided at the time of registration, and these supplies will be made available through University services. Official authorization is essential in the purchase of all instruments and books used in dental courses.

Student Loan Funds and Scholarships

In addition to unrestricted loan funds, available through the Office of Student Financial Aids, certain funds have been dedicated for the use of dental students or for students enrolled in programs of the School of Dentistry.

Oscar W. Burdats Dental Student Revolving Loan Fund. In 1955, friends of Oscar W. Burdats in the Wheeling area established a student loan fund for dental students in recognition of Dr. Burdats' outstanding leadership in the dental profession for more than sixty years. The fund is used for loans to worthy dental students who are residents of West Virginia.

American Fund for Dental Health Loan Program. These loans are made through the Office of Student Financial Aids. Any student in good standing is eligible to borrow from this fund.

Dental School Loan Fund. A generous contribution, made by the Auxiliary of the West Virginia State Dental Society in 1959, initiated a loan fund for students in programs under the administration of the School of Dentistry. Either short-term or long-term loans may be made, depending upon the student's need and eligibility.

Dentistry Fund — West Virginia University Foundation, Inc. Loans to students under the administration of the School of Dentistry may be made from a special fund within the Foundation. Contributions from the West Virginia State Dental Society, the West Virginia Federation of Women's Clubs, Junior Department, and from Dr. D. A. Farnsworth in memory of his brother, Dr. F. M. Farnsworth, were used initially to establish the principal of this fund.

Health Professions Student Loan Program. The School of Dentistry participates in the federal loan program approved under the Health Manpower Act of 1971.

Other restricted loan opportunities. The American Dental Trade Association annually provides loan opportunities to junior and senior students in dental schools of the United States and Canada. Junior and senior women dental students are also eligible for loans from the Association of American Women Dentists.

The following scholarships are available for dental students:

Board of Regents Dental Scholarships. Twenty scholarships are available. The Board of Regents scholarships, divided equally between the four dental classes, provide for the payment of the recipients' tuition and registration fees. To be eligible, applicants must have been enrolled or admitted to the School of Dentistry and must rank above the fiftieth percentile of their class. In the case of entering freshmen, distinct professional promise, as indicated by performance on the Dental Admissions Test, also is used as a criterion for selection. Scholarships are awarded annually. Continuation beyond one semester, however, is assured only if a recipient maintains an academic position in the upper 50 per cent of the class (unless probationary status is recommended by the Supervising Committee), and if the student shows evidence of leadership and good professional attitudes and maintains a satisfactory moral character.

Robert Wood Johnson Foundation Student-Aid Program — This program is designed to aid women students and students from minority and rural backgrounds and is administered by the American Fund for Dental Health in cooperation with the School of Dentistry.

Armed Forces Health Professions Scholarship Program — In this program an eligible student applies to one of three branches of the Armed Forces of his choice. If selected, the student is commissioned a second lieutenant or ensign in the inactive reserve. While in the program, the student receives a stipend of \$400 per month, except during an annual 45-day active duty tour for which the student will receive approximately \$1,100. The active duty tour will be performed at a military hospital or medical center, and will be arranged in order not to interrupt the student's academic work. If required by the school, arrangements may be made to permit serving the 45-day active duty on campus. In addition, the service will pay all tuition, mandatory fees, and related academic expenses of the student. The student incurs an obligation of one year of active commissioned service for each year or fraction of a year of program participation. All participants incur a minimum tour of two years. For further information, you may write one of the following: Department of the Army, DASG-PTP, Washington, DC 20314; Bureau of Medicine and Surgery, Navy Department (Code 3174), Washington, DC 20372; ATC/RSOS, Randolph Air Force Base, TX 78148.

Organizations

American Student Dental Association. Predoctoral and advanced education dental students are eligible to become members of the American Student Dental Association. Membership provides for student membership in the American Dental Association.

American Association of Dental Schools. All dental and auxiliary students, including advanced education students, are eligible to become student members of the American Association of Dental Schools during the period of enrollment in the School of Dentistry.

The WVU School of Dentistry Alumni Association. In a series of meetings held during May, 1961, the first senior class of the School of Dentistry established the WVU School of Dentistry Alumni Association. The Association promotes the educational program of the School of Dentistry. Full membership is extended to all graduates of the School, and associate memberships are available to others interested in the aims of the Association.

Omicron Kappa Upsilon. On February 6, 1961, the Alpha Beta Chapter of Omicron Kappa Upsilon, national honorary dental society, was chartered at the

School of Dentistry. Student membership is limited to 12 per cent of each senior class. Candidates are selected from the academically superior 20 per cent.

Dental Fraternities. Chapters of three national dental fraternities were organized and established in 1962. First formal initiation ceremonies were conducted on February 9, 1962, by Beta Theta Chapter of Xi Psi Phi and Chi Chi Chapter of Delta Sigma Delta, and on February 10, 1962, by Sigma Chapter of Psi Omega. Membership in each fraternity is limited by an established class quota. Individual eligibility is based upon an accumulated 2.0 average.

Courses of Instruction in Dentistry

Each course is designated by the name of the department teaching it, its number and title, the semester in which it is offered, and hours of credit. Generally, those courses given in the first year are numbered 300-324; second year, 325-349; third year, 350-374; and fourth year, 375-399.

Fixed Prosthodontics

Professors Adams; Associate Professors McCurdy and Tucker; Assistant Professors Kwiatkowski and Ladwig; Instructors K. Smith and Atkins.

- 314. *Fixed Prosthodontics 1.* S. 1 hr. Preclinical lectures and laboratory exercises in which first-year students are introduced to the technics of preparing and restoring teeth with crown restorations.
- 336. *Fixed Prosthodontics 2.* Yr. 4 hr. Lectures and laboratory exercises on principles and technics of crown and bridge prosthodontics.
- 357. *Fixed Prosthodontics 3.* Yr. and S. 4 hr. Lectures and procedures employed in clinical practice. Types of dental bridges, their indications and contraindications.
- 389. *Fixed Prosthodontics 4.* I and II. 2-4 hr. Clinical practice of crown and bridge prosthodontics. Emphasis on problems related to diagnosis and construction of more complex dental bridges.

Dental Anatomy

Associate Professor Farace; Assistant Professor Kwiatkowski; Instructors K. Smith and Foor.

- 310. *Dental Anatomy and Occlusion.* I. 4 hr. Anatomy of individual teeth, both permanent and primary in regard to form and function and their static and dynamic occlusal relationships.

Dental Auxiliary Utilization

Professor Brown; Associate Professors Farace, Gaver, and Puderbaugh; Instructors Frye, Reed, and Walker.

- 325. *Auxiliary Utilization 1.* II and S. 2 hr. Designed through didactic and clinical experience to prepare dental students in the concepts of four-handed dentistry.
- 371. *Auxiliary Utilization 2.* Yr. and S. 3 hr. PR: Dent. 325. Continuation of clinical experience in four-handed dentistry and familiarization with TEAM approach to dental health care including TEAM composition, duty delegation, appointment and treatment planning sequences, TEAM management, and evaluation of clinical restorative dentistry.

375. *Auxiliary Utilization 3.* I, II. 1-2 hr. PR: Dent. 371. Continuation of clinical practice using auxiliaries, particularly those trained in expanded duties.

Dental Materials

Professor Overberger; Associate Professors Hutchinson and McCurdy; Instructors Condron and Walker.

312. *Dental Materials. I.* 3 hr. Composition, physical, chemical, mechanical, and manipulative properties, and technical uses of dental restorative materials as related to dentistry.

Endodontics

Professors Alberico and Biddington; Associate Professor Griffin and Skidmore; Assistant Professor Shuman; Instructor Clark.

321. *Endodontics 1.* S. 2 hr. Preclinical lectures and laboratory exercises on basic technical and biological requisites in the treatment of diseases of the dental pulp and the periapical tissues.
342. *Endodontics 2.* Yr. and S. 1 hr. Minor clinical endodontic procedures which will stress the application of principles presented in Dent. 321.
362. *Endodontics 3.* Yr. and S. 2 hr. Lectures and their continued application in the treatment of pulpal and periapical disease.
380. *Endodontics 4.* I and II. 1-2 hr. Continued clinical endodontics stressing the diagnosis and treatment of endodontic problems.

Medicine

Professors Flink, Sleeth, and Welch.

333. *Physical Diagnosis. II.* 1 hr. Lectures and demonstrations procedures involved in performing a physical examination and in understanding the hospital medical chart from standpoint of history, physical examination, laboratory, and x-ray examination data.
374. *Principles of Medicine. I.* 2 hr. General diseases about which the dental student should have intelligent working knowledge. Students assigned to specific hospitalized patients to review their findings with the class.

Operative Dentistry

Professor Sausen; Associate Professors Farace, Gaver, Hutchinson, and Puderbaugh; Assistant Professors Chapman and Frye; Instructors Condron, Foor, Kelly, Layman, Naylor, Reed, Walker, and Wright.

304. *Operative Dentistry 1.* II. 4 hr. Preclinical course in principles of cavity preparation, manipulation of plastic restorative materials, and related instrumentation. Gold inlay technique introduced. Characteristics and treatment of caries emphasized.
322. *Operative Dentistry 2.* S. 2 hr. Preclinical course to include a variety of cavity forms and their restoration with compacted golds. Preparation is made for entering clinical activity. Certain fundamentals of pedodontics introduced.
329. *Operative Dentistry 3.* Yr. 3 hr. Initiation of clinical practice with comprehensive examinations and treatment planning of assigned patients. Lectures relate to standard clinical procedures and to laboratory instruction in direct and indirect cast gold restorations.

- 348. *Operative Dentistry 4*. S. 2 hr. Cavity medications, biological reactions to restorative materials and techniques, bur technology, and clinical variations of cavity form and treatment. Clinical practice is expanded, and includes a significant number of gold restorations.
- 358. *Operative Dentistry 5*. Yr. and S. 3 hr. More complex and advanced techniques for clinical practice and new developments throughout the scope of operative dentistry. Clinical practice expanded to provide experience in all classifications of restorative procedures.
- 383. *Operative Dentistry 6*. I and II. 2-4 hr. Clinical experience course in which additional cases are treated to improve upon efficiency and finesse. Sufficient variety and depth of experience is obtained to reach adequate competence for independent practice of operative dentistry.

Oral Diagnosis

Professor Graham; Associate Professor Thomas; Assistant Professor H. Smith; Instructor Kaduk.

- 303. *Oral Diagnostic Techniques*. II. 2 hr. Lectures and laboratory exercises introduce and stress fundamental principles of oral diagnosis including patient health history and clinical examination methods. Intraoral roentgenography. General approach to treatment planning for comprehensive oral health care.
- 323. *Clinic Orientation*. S. 1 hr. Series of specially arranged lectures, demonstrations, and clinical exercises to orient student to clinical procedures in the clinical disciplines.
- 337. *Oral Diagnosis 1*. Yr. and S. 2 hr. Didactic instruction with further application of diagnostic procedures presented in Dent. 303, extended to include special examination procedures and technics applicable to evaluating clinical problems.
- 364. *Oral Diagnosis 2*. Yr. and S. 1 hr. Clinical application of principles presented in Dent. 337.
- 387. *Oral Diagnosis 3*. I and II. 1-2 hr. Continued clinical experience providing opportunities for further independent observation and analysis of clinical problems.

Oral Pathology

Professor King; Associate Professor Lalonde.

- 338. *Oral Pathology*. (For dental and dental hygiene students.) II. 4 hr. PR: Consent; Path. 328. Application of knowledge gained in general pathology to study specific diseases affecting the oral cavity.
- 353. *Oral Oncology*. (For dental students.) I. 1 hr. PR: Consent; Dent. 338. Recognition of benign, malignant, and premalignant lesions with emphasis on biopsy, exfoliative cytology, and other clinical diagnostic procedures.
- 355. *Clinico-Pathologic Correlation Conference*. (For dental students.) II. 1 hr. PR: Consent; Dent. 338, 353. Interesting clinical cases are demonstrated grossly, radiographically, and histologically. Diagnosis is established and treatment discussed.
- 382. *Clinic-Pathologic Correlation Conference*. (For dental students.) I and II. 1-2 hr. PR: Consent; Dent. 338, 353. Interesting clinical cases are demonstrated grossly, radiographically, and histologically. Diagnosis is established and treatment discussed.
- 401. *Advanced Oral Pathology*. I, II, S. 1-3 hr. PR: Consent. Advanced seminar and laboratory of local and systemic disease processes affecting the oral structure.

Oral Roentgenology

Professor Graham; Associate Professor Thomas; Assistant Professor Smith; Instructor Kaduk.

- 327. *Oral Roentgenology*. I. 1 hr. Physical and biological phenomena associated with x-radiation. Intraoral and extraoral technics presented and instruction in interpretation of roentgenograms, with special emphasis relative to oral diagnosis.
- 367. *Clinical Oral Roentgenology* 1. Yr., S. 1 hr. Clinical application of principles presented in Dent. 303 and 327.
- 396. *Clinical Oral Roentgenology* 2. I and II. 1-2 hr. Additional clinical experience in oral roentgenology.

Oral Surgery

Professors Campbell and Welch; Associate Professor Graves; Assistant Professor Oliverio; Special Lecturers Davidson and Wallace.

- 300. *Anesthesiology*. II and S. 1 hr. Introduction to general anesthesia; lectures on local anesthesia, including types, modes of action, indications, and contraindications for use. Pre-medication, toxic effects, and technics of administration are discussed.
- 339. *Oral Surgery* 1. II and S. 2 hr. Didactic instruction and clinical experience in basic surgical principles as applied to the extraction of teeth, including classification and techniques for the surgical removal of impactions.
- 359. *Oral Surgery* 2. Yr. and S. 4 hr. Didactic instruction in diagnosis and surgical and adjunctive treatment of diseases, injuries, and defects of human jaws and associated structures. Practical training obtained by assignments in the oral surgery clinic and in University Hospital.
- 384. *Oral Surgery* 3. I and II. 2-4 hr. Continuation course in oral surgical procedures including additional experience in the hospital environment.
- 400. *Advanced Oral Surgery*. I, II, S. 1-12 hr. PR: Consent. Advanced study of therapeutics, hospital protocol, and surgical aspects of oral surgery involving lectures, seminars, demonstrations and clinical applications.

Orthodontics

Professor Merow; Assistant Professors Dempsey, Gaston, Martin, Pringle, and Wilfong; Visiting Lecturer Watson.

- 345. *Principles of Orthodontics*. II. 1 hr. Facial growth and development, the development of dental occlusion, and etiology and classification of malocclusions.
- 346. *Orthodontic Technics*. S. 1 hr. Technical instruction in taking diagnostic records and constructing basic orthodontic appliances.
- 365. *Clinical Orthodontics* 1. Yr. and S. 2 hr. Case analysis, treatment planning, clinical practice, and seminars concerning interceptive, preventive, and adjunctive treatment of malocclusions.
- 385. *Clinical Orthodontics* 2. I and II. 1-2 hr. Continued clinical management of selected malocclusion problems.

Pedodontics

Associate Professors Nash and McCutcheon; Assistant Professor Johnsen; Instructors Ronk, Ruby, and Gwynn.

335. *Pedodontics 1.* Yr. and S. 3 hr. Lecture and clinical practice in preventive diagnosis and treatment of dental disease of children, including dental caries, pulpal therapy, appliance considerations, and child management techniques.
361. *Pedodontics 2.* Yr. and S. 3 hr. Lectures and seminars on more advanced problems of children's dentistry including a number of congenital and systemic conditions related to oral health. Clinical practice in areas of child management, interceptive and preventive orthodontics, and applied restorative procedures.
386. *Pedodontics 3.* I and II. 1-2 hr. Additional opportunities for student to reach an adequate level of understanding and experience in pedodontics.

Periodontics

Associate Professor Morrison; Instructors Balaban, Witzemberger, and Wanker.

311. *Periodontics 1.* S. 1 hr. Histopathology of periodontal disease with emphasis on etiology, examinations, diagnosis and treatment planning. Laboratory instruction on correct periodontal instrumentation.
340. *Periodontics 2.* Yr. and S. 3 hr. Didactic and clinical instruction on diagnosis and treatment of periodontal diseases, including occlusion and selective grinding techniques.
363. *Periodontics 3.* Yr. and S. 2 hr. Didactic and clinical instruction correlating periodontics with all other areas of dentistry with continued clinical diagnosis and treatment of periodontal diseases.
377. *Periodontics 4.* I and II. 1-2 hr. Continued and additional clinical experience in clinical diagnosis and treatment of periodontal disease.

Removable Prosthodontics

Professors Bianco and Somers; Associate Professor DeCounter; Assistant Professors Kluth and Van Riper; Instructors Christian, Glover, Holovak, and Willett; Special Lecturer DiNapoli.

313. *Removable Prosthodontics 1.* I. 3 hr. Lectures and laboratory practice in biomechanical requirements of the edentulous patient.
316. *Removable Prosthodontics 2.* S. 1 hr. Lectures and laboratory practice in maxillo-mandibular relationships and occlusion.
334. *Removable Prosthodontics 3.* Yr. 3 hr. Didactic and laboratory practice for treatment of the partially edentulous patients, and introduction to clinical complete denture prosthodontics.
341. *Removable Prosthodontics 4.* S. 2 hr. Clinical demonstrations correlating the didactic and laboratory practices with the actual treatment of a removable prosthodontic patient.
350. *Removable Prosthodontics 5.* Yr. and S. 4 hr. Lectures and general clinical practice in complete and partial removable prostheses.
376. *Removable Prosthodontics 6.* I and II. 2-4 hr. Continued clinical practice in various and special removable prosthodontic procedures.

Preventive Dentistry and Community Health

Associate Professors McCutcheon, Griffin, Howard, and Thomas.

- 315. *Preventive Dentistry and Community Health 1.* Yr. 4 hr. A multipartite course encompassing the fundamentals of sociology, ethics, professional communication, and clinical psychology as they apply to the study and practice of dentistry. Introduction to the theory and practice of preventive dentistry.
- 320. *Preventive Dentistry and Community Health 2.* II. 1 hr. Fundamentals of statistical analysis and the scientific method necessary to the understanding of dental research.
- 330. *Preventive Dentistry and Community Health 3.* II. 1 hr. Lectures and field experience provide the student with a basic knowledge of the principles of dental public health practice. Emphasis on dental epidemiology and preventive dentistry at the community level.
- 332. *Preventive Dentistry and Community Health 4.* S. 1 hr. A bipartite course providing lectures in the advanced theory and practice of preventive dentistry. Intermediate considerations of ethics in dental practice.
- 352. *Preventive Dentistry and Community Health 5.* Yr. 4 hr. A tripartite course of lectures on fundamental legal rights, obligations, and responsibilities of the dentist; on effective practice management; and seminars, proseminars and field experience in oral communication, health education, and social psychology.
- 354. *Preventive Dentistry and Community Health 6.* S. 1 hr. A bipartite course of lectures covering the origin and development of dentistry, and immediate ethical practice considerations.
- 394. *Preventive Dentistry and Community Health 7.* I and II. 1-2 hr. Continued field experience in various aspects of community health.

ADVANCED EDUCATION PROGRAMS

The School of Dentistry offers advanced education programs. The Department of Orthodontics offers a program of advanced study leading to the Master of Science degree. Programs leading to the Master of Science and Doctor of Philosophy degrees are available in the basic sciences of Anatomy, Microbiology, Biochemistry, Biophysics, Physiology, and Pharmacology. (See Basic Sciences.) The Department of Oral Surgery offers one Oral Surgery internship and two Oral Surgery residencies. The general practice residencies also are offered by the School of Dentistry. Continuing education courses are offered throughout the year. Detailed information concerning admission requirements, courses of study, etc., in the intern and residency programs may be obtained from the Office of the Associate Dean for Advanced Education Programs.

ORTHODONTIC PROGRAM

Master of Science

The School of Dentistry and its Department of Orthodontics offer a program of advanced study and clinical training leading to the Master of Science degree. The program requires a minimum of 23 months (two academic years and two summer sessions) of full-time residency in the School of Dentistry, and is designed to qualify dentists for careers in orthodontic clinical practice, teaching, and research.

Inquiries concerning this program should be directed to the Office of the Associate Dean for Advanced Education Programs. Applicants will be recommended to the Graduate School for admission. Those applicants approved for admission to the program will be notified soon after January 15.

Requirements for Admission to Orthodontic Program

1. Graduation from an accredited dental school.
2. Evidence of scholastic and clinical achievement that would indicate the applicant's ability to progress in a program of this nature.
3. Each applicant must file with the department all information requested in the department application form.

Requirements for Master of Science Degree for Students Enrolled in Orthodontic Program of School of Dentistry

1. Fulfillment of requirements of the Graduate School.
2. Twenty-three months (two academic years and two summer sessions) of consecutive residency at the School of Dentistry.
3. An approved master's thesis based on original research completed during the period of residency in an area related to orthodontics.
4. Must satisfactorily pass a final oral examination.
5. Must complete a minimum of 56 credit hours. These include 35 hours of orthodontic courses, a minimum of 9 hours of selected basic science subjects, and a minimum of 6 hours of elective allied subjects, and a thesis (6 hours).
6. Must have demonstrated satisfactory clinical competence in the student's field.
7. Must have maintained a grade level commensurate with graduate education.

Orthodontics

416. *Biomechanics*. I, II, S. 2 hr. PR: Consent. Design and function of the teeth and their surrounding structures, and response of these tissues to orthodontic procedures.
417. *Orthodontic Technique*. I, II, S. 2 hr. PR: Consent. Laboratory course in techniques related to fabrication and manipulation of orthodontic appliances.
418. *Orthodontic Materials*. I, II, S. 1 hr. PR: Consent. Physical properties of materials used in orthodontic appliances.
419. *Orthodontic Diagnosis*. I, II, S. 1-3 hr. PR: Consent. Seminar-type class on technique of patient examination, acquiring diagnostic records, and analyzing and correlating this information to the treatment of clinical problems.
420. *Cephalometrics*. I, II, S. 1-3 hr. PR: Consent. Use of radiographic cephalometry in studying growth of the human face, analysis of dentofacial malformations, and evaluation of orthodontic treatment.
421. *Orthodontic Mechanics*. I, II, S. 1-4 hr. PR: Dent. 416, 417. Seminar and laboratory course on basic orthodontic mechanical properties.
422. *Advanced Orthodontic Mechanics*. I, II, S. 1 hr. PR: Dent. 421. Continuation of Dent. 421 involving more difficult type cases and introducing more sophisticated appliance therapy.

423. *Growth and Development*. I, II, S. 1-5 hr. PR: Consent. Seminar-type course on normal and abnormal growth of the human head and its application to orthodontics.
425. *Orthodontic Seminar*. I, II, S. 1-8 hr. PR: Consent. Discussions involving all branches of dental science, with special emphasis on the orthodontic interest. Assigned topics and articles in the literature discussed.
426. *Orthodontic Clinic*. I, II, S. 1-12 hr. PR: Dent. 416, 417. Clinical treatment of selected patients.
497. *Research*. I, II, S. 1-15 hr.



Marble pylons at the Basic Sciences entrance to the WVU Medical Center depict milestones in the history of the health sciences.

Part 7

MEDICAL CENTER BASIC SCIENCES

In addition to providing courses for students of medicine, dentistry, pharmacy, nursing, and other allied health professions, the Departments of Anatomy, Biochemistry, Microbiology Pharmacology, and Physiology and Biophysics offer programs leading to the M.S. or Ph.D. degrees.

Anatomy

Professors Enlow (*Chairman*), Jones, Kimmel (Emeritus), McCafferty, Reyer, and Williams (Emeritus); Associate Professors Beresford, Butcher, Culbertson, Friedman, Haines, and Pinkstaff; Assistant Professors Carmichael, Frederickson, Hilloowala, Overman, and Pope; Lecturer Walker.

Research Areas — Gross Anatomy: Anatomical variations and anomalies, and electromyographic studies of specific muscle groups. Microscopic Anatomy: Studies of cells, tissues and organs, under normal and experimental conditions with histochemical, electron microscopic, autoradiographic, regenerative, and fluorescent techniques. Developmental Anatomy: Experimental and descriptive embryology, cellular differentiation, and dedifferentiation, organizers and the effects of different environments on development. Neuroanatomy: Experimental, comparative and embryological studies of specific nerve cell groups and nerve pathways in the spinal cord, brain stem, cerebellum and cerebrum.

Anat.

101. *Principles of Human Anatomy*. I. 3-4 hr. PR: Consent. Lectures and demonstrations on the gross and microscopic anatomy of the human body including development. Designed for students in the paramedical sciences.
102. *Gross Anatomy*. (For physical therapy students.) II. 3 hr. PR: Anat. 101 or consent. Functional gross anatomy of the back, extremities, and head.
103. *Microanatomy*. (For physical therapy students.) I. 2 hr. PR: Consent. Introductory cell and tissue structure for students in the Division of Physical Therapy.
109. *Oral Histology*. (For dental hygiene students.) II. 3 hr. Histological structure and embryological development of the teeth and tissues of the oral cavity.
152. *Introduction to Physical Anthropology*. II. 3 hr. PR: Consent. Man's physical heritage (human evolution) in principle and through paleontology, man's current physical nature (race and ecology), and biologic basis of man's culture.
301. *Gross Anatomy of the Trunk*. (For medical and graduate students.) I. 5 hr. PR: Consent. Gross anatomical study of the back, thorax, abdomen, pelvis, and perineum.
302. *Gross Anatomy of the Head and Neck*. (For medical and graduate students.) II. 3 hr. PR: Consent. Gross anatomical study of the head and neck.
304. *Gross Anatomy of the Extremities*. (For medical and graduate students.) II. 2 hr. PR: Consent. Gross anatomical study of the upper and lower extremities.
305. *Microanatomy*. (For medical and graduate students.) I. 6 hr. PR: General biology or equiv. and consent. Cells, tissues, and organs.

306. *Gross Anatomy of the Trunk and Extremities.* (For dental and graduate students.) I. 4 hr. PR: General biology and consent. Gross anatomical study of the back, upper extremity, thorax, abdomen, and pelvis.
307. *Gross Anatomy of the Head and Neck and Neuroanatomy.* (For dental and graduate students.) II. 5 hr. PR: Anat. 306 or equiv. and consent. Gross anatomical study of the head and neck and a brief gross and microscopic anatomical study of central nervous system.
308. *Neuroanatomy.* (For graduate students, students in physical therapy, and other health sciences.) II. 2 hr. PR: Consent. Gross and microscopic structure of the central nervous system. (See also Neurobiology, Conjoined Course 375.)
309. *Microanatomy and Organology.* (For dental and graduate students.) I. 4 hr. PR: General biology or equiv. and consent. Cells, tissues, and organs.
312. *Special Topics in Anatomy.* II. 2-4 hr. PR: Anat. 301 or 306 or 309; consent. Different topics of current interest in anatomy, not included in the regular graduate courses.
314. *Applied Anatomy.* II. 2-6 hr. per sem. PR: Consent. Detailed study of anatomy adapted to the needs of the individual student.
318. *Oral Histology and Embryology.* (For dental and graduate students.) II. 2 hr. PR: Anat. 305 or 309, and consent. Structure, function, and development of oral tissues and organs.
401. *Advanced Gross Anatomy.* I, II. 2-6 hr. per sem. PR: Anat. 301, 302, 304, and consent. Morphological and functional analysis of a selected region. With dissection.
402. *Advanced Developmental Anatomy.* II. 2-4 hr. per sem. PR: Anat. 301, 302, 304, and/or consent. Detailed developmental anatomy of the fetal period and infancy. With dissections and analysis of variations and malformations.
403. *Seminar.* I, II. 1-6 hr. 1 hr. per sem. Course may be repeated. PR: Consent. Special topics of current or historical interest.
405. *Experimental Embryology.* II. 3 hr. PR: Embryology and cellular physiology or biochemistry and consent. Development, differentiation, and regeneration.
406. *Advanced Neuroanatomy.* I. 2-4 hr. per sem. PR: Conjoined Course 375 or consent. Detailed study of selected areas of the nervous system. May be repeated.
408. *Histochemistry.* II. 3 hr. PR: Anat. 305 or 309, biochemistry, and consent. Histochemical theory and techniques.
451. *Advanced Microanatomy.* I, II, or S. 2-4 hr. PR: Anat. 305 or 309 or Biol. 263 and consent. An extension of the major topics included in Anat. 305 or 309. Special emphasis on recent contributions.
491. *Advanced Anatomy.* I, II. 2-8 hr.
497. *Research.* I, II, S. 1-15 hr. PR: Consent. May be repeated as needed with consent of the Graduate Committee.

Biochemistry

Professors Krause (*Chairman*), Canady, Koppelman, Lotspeich, Rafter, Resnick, and Wirtz; Associate Professors Katz and Tryfiates; Assistant Professors Blair, Ellingson, Harris, Jagannathan, and Ponton.

Research Areas — Nutrition: Vitamin A and carotene metabolism and metabolic role, manganese deficiency, B-6 nutrition in tumors. Organic synthesis and biological testing of amino acids analogues. Regulation of protein synthesis. Protein structure and biological activity. Immunochemistry; complement factors; antigen-antibody reactions. Chemistry of host-parasite relationship. Regulation of carbohydrate and lipid metabolism. Enzyme kinetics.

Biochem.

139. *Introduction to Biochemistry*. I. 4-5 hr. PR: Inorganic chemistry, and consent. A. Lecture and conference, 4 hr. B. Laboratory, 1 hr.
231. *General Biochemistry*. I. 4-7 hr. PR: Inorganic chemistry, Organic chemistry, and consent. Medical and graduate studies. A. Lecture, 4 hr. (includes conference for medical students). B. Laboratory and demonstration, 3 hr.
239. *Clinical Chemical Techniques*. (Primarily for medical technology students.) II. 4 hr. PR: Biochem. 139, 231 or equiv. Open to other qualified students.
305. *General Biochemistry*. II. 4 hr. PR: Inorganic chemistry, Organic Chemistry, and consent. Dental and graduate students. A. Lecture and conference. B. Laboratory and demonstration.
399. *Special Topics*. I, II, S. 1-12 hr. PR: Consent.
491. *Advanced Study*. I, II. 1-6 hr. PR: Biochem. 139, 231, or equiv. and consent.
- Amino Acids, Peptides, and Proteins*. I. 2 hr.
- Enzymology*. I. 2 hr.
- Immunochemistry*. I. 2 hr. Biosynthesis, chemistry, and biological properties of proteins important in immunology.
- Nucleic Acids and Protein Synthesis*. II. 2 hr.
- Lipids*. II. 2 hr. PR: Agr. Biochem. 291 or Med. Biochem. 231, consent. Chemical and physical properties of various classes of lipids and their biochemical and physiological pathways within the cell and cellular particulates.
- Enzyme Kinetics*. II. 3 hr. Physical mechanisms of enzyme action.
496. *Graduate Seminar*. I, II, S. 1 hr. PR: Biochem. 231 or equiv., consent. Presentation and discussion of special topics.
497. *Research*. I, II, S. 1-15 hr.

Conjoined Basic Sciences Courses

In the curricula of the Basic Sciences in the Medical Center, certain courses are conducted on nondepartmental or interdepartmental lines. These have been designed as Conjoined Courses.

314. *Medical Human Growth and Development*. (For medical and graduate students.) II. 1 hr. PR: Consent. Basic considerations of embryology, organogenesis, teratology, and other factors influencing intrauterine growth and development and the adaptation of the fetus to extrauterine life.
322. *Biostatistics and Evaluation of Medical Literature*. (For medical and graduate students.) I. 2 hr. PR: Consent. Statistical analysis of biologic phenomenon as related to medicine.
370. *Medical Genetics*. (For medical and graduate students.) II. 1 hr. PR: Consent. Genetics and heritable diseases in man.
375. *Neurobiology*. (For medical and graduate students.) II. 6 hr. PR: Anat. 301 and Physiol. 345, or consent. Anatomy and physiology of the nervous system correlated with clinical neurology.
399. *Selective Experiences in Medicine*. Fourth year. I, II, S. CR. PR: Satisfactory completion of first three years of medical curriculum. (Graded as S or U.) The selective program for fourth-year medical students offers a wide range of opportunities, in the basic sciences, medical specialties and sub-specialties, and in family medicine. The year is composed of twelve four-week blocks. Six must be spent at WVU Medical Center in Morgantown and approved programs at the Charleston Division,

WVU Medical Center; Wheeling Division, School of Medicine; and Veterans Administration Hospital, Clarksburg. The remainder may be spent at community hospitals in West Virginia, or at university or university-affiliated hospitals out-of-state. Each student plans his individual program, with faculty advice. Flexibility is permitted. With consent of the instructors concerned, the student may, during the year, alter his selective choices. The student must give five weeks notice before changing an intramural or extramural selection. (See intramural and extramural folders, published annually, describing the selective opportunities.)

Microbiology

Professors Snyder (*Chairman*), Burrell, Deal, Hall, Slack, and Voelz; Associate Professors Gerencser, Kirk, Pore, and Veltri; Assistant Professors Charon, Mengoli, and Yelton; Instructors Major and Pavlech.

Research Areas — Pathogenic Bacteriology: Mode of action of microbial products in pathogenicity; Identification and classification of anaerobic microorganisms including filamentous bacteria; oral microbiology; ecology of the oral cavity. Mycology: Pathobiology of medical mycoses; environmental health implications of fungal and algal toxicoses. Physiology: Nutrition and metabolism of a variety of pathogenic microorganisms. Genetics: Basic studies on the mechanisms of genetics including transformation of genetic information. Virology: Basic studies on viral-tumor relationships; transduction of mammalian genome by viruses; effect of environmental lead on tumor development; pathogenesis of lymphocytic choriomeningitis virus; clinical virology. Parasitology: Host-parasite relationships between helminth parasites and insect and vertebrate hosts. Electron Microscopy: Cytological studies of the fine structures of microorganisms and the influence of environment on these structures. Immunology: Studies on the mechanisms of antigen-antibody reactions and the development of hypersensitivity.

Microbiol.

26. *Microbiology*. II. 3-4 yr. (For students in paramedical sciences.) Pathogenic microorganisms.
220. *Microbiology*. II. 4 hr. (For pharmacy students.) PR or Conc.: Biochemistry. Pathogenic microorganisms, including immunology and antimicrobial agents.
223. *Microbiology*. II. 5 hr. (For medical technology students; graduate students with consent.) PR or Conc.: Organic chemistry. Basic microbiology. Emphasis on immunology, pathogenic microorganisms, and clinical laboratory techniques.
224. *Parasitology*. II. 4 hr. (For medical technology students.) Animal parasites and vectors of disease.
301. *Microbiology*. I. 5-7 hr. (For medical and graduate students.) (5 hr. for graduate students taking only the lectures.) PR: Organic chemistry, Biochemistry. Detailed study of pathogenic microorganisms. Emphasis on use of microbiology in solving clinical problems.
302. *Microbiology*. I. 5 hr. (For dental students.) PR: Organic chemistry. Detailed study of pathogenic microorganisms. Emphasis on oral flora.
316. *Basic Microbiology*. I. 4 hr. (For graduate students.) PR: Organic chemistry; Biology recommended; consent. Detailed review of major groups of microorganisms, including morphology and physiology.
317. *Special Problems in Microbiology*. I, II, S. 1-6 hr. per sem. with a total of 24 hr. available. PR: Microbiol. 316 or equiv. (Graded as S or U.)

318. *Diagnostic or Determinative Microbiology*. I, II, S. 1-6 hr. per sem. with a total of 24 hr. available. PR: Microbiol. 316 or equiv; consent. Limited enrollment. Laboratory identification of pathogenic microorganisms. Includes practical experience in a clinical microbiology laboratory. (Graded as S or U.)
319. *Comparative Cytology*. II. 4 hr. PR: Microbiol. 320; consent. Limited enrollment. Basic features in structure and function of animal, plant, and microbial cells and their organelles. Projects in electron microscopy.
320. *Electron Microscopy*. II. 2 or 4 hr. PR: Consent. Limited enrollment. Preparation techniques and operation of electron microscope.
321. *Bacterial Physiology*. I. 3-4 hr. (Lect. 3 hr.; with lab. 4 hr.) PR: Microbiol. 316 or equiv.; Organic chemistry or Conc.: Biochemistry. Physiological studies on bacteria, including nutrition, metabolic pathways, growth, and death.
322. *Microbial Genetics*. II. 4 hr. PR: Microbiol. 316 or equiv.; consent. Microbial mutation and adaptation, bacterial gene transfer mechanisms, and cytoplasmic inheritance.
323. *Immunology*. II. 4 hr. PR: Microbiol. 316 or equiv. Antigens, antibodies, and their reactions both *in vitro* and *in vivo* with emphasis on theoretical and experimental problems.
324. *Virology*. II. 4 hr. PR: Microbiol. 316 or equiv.; Biochemistry. The basic biology of human, animal, and bacterial viruses.
325. *Medical Mycology*. I. 4 hr. PR: Microbiol. 316 or equiv. Fungi pathogenic for man and animals.
326. *Seminar*. I, II, S. 1 hr. PR: Microbiol. 316 or equiv. Includes the history of microbiology. (Graded as S or U.)
327. *Parasitology*. II. 4 hr. (For Graduate students.) Animal parasites and vectors of disease.
496. *Seminar*. I, II, S. 1 hr. PR: Microbiol. 316 or equiv. Includes the history of microbiology. (Graded as S or U.)
497. *Research*. I, II, S. 1-15 hr. PR: Microbiol. 316 or equiv. Students may enroll more than once. (Graded as S or U.)

Pathology

Professors Rodman (*Chairman*), Albrink, Anido, Chou, Hales, King, Morgan, and Stevenson; Clinical Professor Ladewig; Associate Professor Rochlani and Lalonde; Clinical Associate Professor Abernathy; Assistant Professors Evans, Jalota, Jenkins, Salisbury, and Shah; Clinical Assistant Professors Caldwell, Giarritta, Jaganna, Than, Kim, Mastrangelo, Ruffolo, and Stinely; Instructor Abraham; Research Associate DeNee.

Path.

128. *Introduction to General Pathology*. I. 2 hr. PR: Enrollment in Dental Hygiene or Physical Therapy. A study of the basic pathologic processes in man.
328. *General Pathology*. (For dental students). I. 6 hr. PR: Anat. 309. General changes in basic pathologic processes and changes evoked in specific organ systems as a basis for understanding clinical disease.
338. *Oral Pathology*. (For dental students). II. 3-4 hr. PR: Enrollment in Dental Hygiene or Dentistry. Application of knowledge gained in Path. 328 to study of specific diseases affecting the oral cavity.

350. *Hematology*. 3 hr. PR: Consent.
352. *Laboratory Medicine*. (For medical students, second year). II. 5 hr. PR: Consent. All topics relating to clinical pathology; hematology, fluid and electrolytes, clinical microscopy, serology, and blood banking.
353. *Oral Oncology*. (For dental students). I. 1 hr. PR: Consent; Path. 338. Recognition of benign, malignant, and pre-malignant lesions with emphasis of biopsy, exfoliative cytology, and other clinical diagnostic procedures.
354. *General Pathology*. (For medical students, second year.) Yr. 10 hr. PR: Consent. Includes gross and microscopic studies with demonstrations.
355. *Clinico-Pathologic Correlation Conference*. (For dental students, third year). II. 1 hr. PR: Consent; Path. 338, 353. Interesting clinical cases are demonstrated grossly, radiographically, and histologically. Diagnosis is established and treatment discussed.
356. *Advanced Pathology*. I, II. 3 hr. PR: Path. 328 and 354, and consent. Microscopic and gross specimens from selected autopsies.
382. *Clinico-Pathologic Correlation Conference*. (For dental students, fourth year). I and II. 1-2 hr. PR: Consent; Path. 353, 358. Interesting clinical cases are demonstrated grossly, radiographically and histologically. Diagnosis is established and treatment discussed.
401. *Advanced Oral Pathology*. I, II. 1-3 hr. PR: Consent. Advanced seminar and laboratory study of local and systemic disease processes affecting the oral structure.
497. *Research*. I, II. 1-15 hr. PR: Consent.

Pharmacology

Professors Fleming (*Chairman*), Saxe, Thomas, Stitzel, and Robinson; Associate Professors Cenedella, Craig, Westfall, Van Dyke, Ramanan, and Graves; Assistant Professors Azzaro, Mawhinney, Smith, Colasanti, and Urquilla.

Research Areas — Autonomic pharmacology; autonomic regulation of the cardiovascular system and of smooth muscle; sensitivity to autonomic drugs; electrophysiologic studies of cardiac and smooth muscle; synthesis, storage, release and metabolism of transmitters and adrenal medullary hormones. Chemotherapy: antimalarial agents, anticancer agents, effects of pharmacological agents on single cell organisms. Biochemical pharmacology: drug metabolism, effects of drugs on lipid and nucleic acid metabolism. Endocrine pharmacology: mechanism of action of steroids, metabolism of sex accessory tissues, relationship of hormones to tumor growth and development. Neuropharmacology: biochemical basis of epilepsy, mechanism of action of anticonvulsant drugs, neuromediators in the central nervous system. Toxicology: metabolism of toxic agents, tolerance to organophosphorus compounds. Electron microscopy; effects of drugs on the ultrastructure of cells.

Pharmacol.

160. *Pharmacology*. (For undergraduate students in the paramedical sciences.) II. 3 hr. Interactions of clinically useful therapeutic agents with the mammalian system.
261. *Pharmacology*. (For pharmacy and graduate students.) I. 5 hr. PR: Physiology. Lecture and laboratory on principles, clinical applications, and laboratory methods in pharmacology.
360. *Pharmacology*. (For dental and graduate students.) I. 4 hr. PR: Physiology. Lecture and laboratory on pharmacologic actions and therapeutic uses of drugs.

361. *Pharmacology*. (For medical students and graduate students.) II. 6 hr. PR: Physiology. Lecture-conference-laboratory on principles, pharmacodynamic actions, and therapeutic applications of clinically useful drugs.
363. *Toxicology*. II. 1 hr. PR: Consent. Toxicological effects of official and non-official drugs and other harmful agents. Special emphasis on symptomatology and treatment of effects of economic poisons.
364. *Advanced Pharmacology*. I. 1-4 hr. PR: Pharmacol. 361 or consent. Advanced lectures and discussion of general principles of pharmacology including physico-chemical properties, absorption, distribution and metabolism of drugs, and drug receptor theory.
365. *Advanced Pharmacology*. II. 1-4 hr. PR: Pharmacol. 361 or consent. Advanced lectures and discussion of specialized areas of pharmacology including biochemical, endocrine and cardiovascular pharmacology.
366. *Advanced Pharmacology (Laboratory in Drug Evaluation)*. S. 1-3 hr. PR: Consent. Laboratory procedures and demonstrations in assessing drug action.
367. *Advanced Neuropharmacology*. I. 1-4 hr. PR: Pharmacol. 361 or consent. Advanced lectures on the actions of drugs on the central and peripheral nervous system.
460. *Special Topics in Pharmacology*. I, II, S. 1-6 hr. per sem. Assigned study on an individual basis for advanced students.
461. *Seminar in Pharmacology*. I, II. 1 hr. per sem. PR: Pharmacol. 361 or graduate status in basic medical sciences.
462. *Literature Survey*. I, II. 1 hr. per sem. PR: Graduate status in pharmacology. Current literature pertinent to pharmacology including journals of allied biological sciences.
463. *Preceptorship*. I, II. 1-2 hr. per sem. PR: Pharmacol. 361 and consent. Critical evaluation of preparation and delivery of lectures in specified areas of pharmacology. For advanced graduate students.
497. *Research*. I, II, S. 1-15 hr. per sem.

Physiology and Biophysics

Professors Wilson (*Chairman*), Gutmann, Lindsay, Marshall, and Moran; Associate Professors Franz, Gladfelter, Lee, McIntyre, Millecchia, and Weber; Assistant Professors Brown, Colby, Frazer, Miles, and Sherwood; Instructors Hankinson, Minns, and Morgan; Lecturer Caldwell.

Research Areas — Cellular, membrane transport and electrical properties of excitable tissue; integrative and behavioral functions of the nervous system; regulation and dynamics of the circulation, respiration, endocrine, and electrolyte balance systems; theoretical and experimental biophysics; and biomedical instrumentation.

Physiol.

141. *Elementary Physiology*. (For undergraduate students in paramedical sciences.) I, II. 4 hr. PR: College biology and chemistry, or consent. Systematic presentation of basic concepts. 3 lect., 1 lab.
248. *Experimental Design*. (For advanced undergraduate and selected graduate students.) II. 3 hr. PR: Consent. Theory and practical experience in design of experiments and processing of physiological data using small laboratory digital computers. 1 lect., 2 lab.

343. *Fundamentals of Physiology.* (For dental and graduate students.) I. 5 hr. PR: College physics, algebra, and chemistry. Analysis of basic facts and concepts relating to cellular processes, organ systems and their control. 3 lect., 1 conf., 1 lab.
344. *Medical Physiology.* (For medical and graduate students.) I. 3 hr. PR: College physics, algebra and chemistry. Analysis of basic facts and concepts relating to cellular processes, organ systems, and their control, with clinical correlations. 1 lect., 1 conf.-lab.
345. *Medical Physiology.* II. (For medical and graduate students.) II. 4 hr. PR: Physiol. 344. Continuation of Physiol. 344. 3 lect., 1 conf.-lab.
346. *Neurophysiology.* (For medical and graduate students.) II. 3 hr. PR: College algebra, physics. Properties of excitable tissues (nerve and muscle), synaptic transmission, reflexes and central nervous system function, and behavior. 2 lect., 1 conf.
347. *Biophysical Analysis.* II. 4 hr. (Alternate years.) PR: Math. 17 and Physiol. 345 or consent. Systems biophysics, method of analysis, and their application in the quantitative study of biological phenomena. 3 lect., 1 conf.-seminar.
399. *Special Topics.* I, II, S. 1-4 hr. PR: Consent. Assigned study designed to develop research skills.
441. *Physiological Methods.* I. 4 hr. PR: Physics 113, 114 or equiv. Theory and application of technics essential to acquisition and processing of physiological data. 2 lect., 2 conf.-lab.
444. *Graduate Seminar.* I, II. 2 hr. PR: Graduate status and consent.
447. *Systems Biophysics.* II. 4 hr. (Alternate years.) PR: Physiol. 347 or consent. Quantitative analysis of physiological regulatory systems. 2 lect., 2 conf.-seminar.
490. *Teaching Practicum.* I, II. 1-3 hr. PR: Consent. Supervised practices in college teaching of physiology. (Graded as S or U.)
491. *Advanced Physiology.* I, II, S. 1-15 hr. PR: Consent. Lecture-conference in: cellular biophysics, neurophysiology, circulation, respiration, acid-base and renal physiology, digestion and energy metabolism, and endocrinology. 3 lect., 3 conf.
497. *Research in Physiology and Biophysics.* I, II, S. 1-15 hr.
499. *Graduate Colloquium.* I, II. 1-6 hr. PR: Consent. (Graded as S or U.)

Part 8

SCHOOL OF MEDICINE

The School of Medicine began as the College of Medicine in 1902. For ten years this program was affiliated with the College of Physicians and Surgeons of Baltimore, Md. In 1912 the School of Medicine had its formal beginning as an independent school offering the first two years of the medical curriculum. The School of Medicine moved from the Downtown Campus to the Medical Center in 1957 and inaugurated a four-year program in 1960. This coincided with the opening of the 522-bed University Hospital. In 1961, the first M.D. degrees were awarded to fifteen students.

In 1945 the School of Medicine established a curriculum in Medical Technology leading to a degree of bachelor of science. The first graduates were awarded a combined degree by the College of Arts and Sciences and the School of Medicine in 1947. The Division of Medical Technology was established in the School of Medicine in 1961. The Division of Physical Therapy was established and accepted its first class of sixteen students in 1970. The Division offers the final two years of a baccalaureate program leading to a degree in physical therapy.

West Virginia University Medical Center, the Charleston Division, was established in October, 1972, with the affiliation of WVU and the Charleston Area Medical Center. The Charleston Division offers programs for third and fourth-year medical students in a variety of required and elective courses.

West Virginia University School of Medicine, the Wheeling Division, was established in 1974. This program is available for many elective opportunities for students in the fourth year.

Committees

Advisory and Admissions Committee to Medical Technology: Vicente Anido, *Chairman.*

Commencement Convocation: Alexander V. Fakadej, *Chairman.*

Dean's Committee to Clarksburg Veterans Administration Hospital: John E. Jones, *Chairman.*

Educational Program Committee: Howard D. Colby, *Chairman.*

Executive Faculty: John E. Jones, *Chairman.*

General Research Support Allocation: John E. Hall, *Chairman.*

Internship Advisory Committee: David Z. Morgan, *Chairman.*

Liaison to Student Body: David Z. Morgan, *Chairman.*

Student Admissions: James D. Martin, *Chairman.*

Academic Standards: Charles R. Craig, *Chairman.*

Student Research Convocation: Roy L. Butcher, *Chairman.*

Student Welfare: David Z. Morgan, *Chairman.*

Degree

The degree of *Doctor of Medicine* (M.D.) is granted to students who have completed the prescribed curriculum and who have been recommended for the degree by the faculty of the School of Medicine.

Combined M.D.-Ph.D. Program

This should be considered only by students who have shown exceptional interest and promise. All of the admission requirements of the School of Medicine and the Graduate School will apply. Specific course requirements and procedures for monitoring progress will be detailed by both schools.

Admission

Because of the large number of applicants and limited openings available, preference in admissions is given to qualified West Virginians although outstanding nonresident applicants will be considered. Careful consideration is given to those personal qualifications which bear upon fitness of applicants for the study and practice of the profession. If accepted, it is expected that the student will complete the work in progress in a manner consistent with his or her previous academic record.

When to Apply for Admission

Application for admission in August, 1976, should be made promptly upon completion of the 1974-75 school year. The latest date for filing an application for August, 1976, is December 1, 1975. Applications are considered as they are received; therefore it is highly desirable to apply early. Applicants filing later, as well as applicants who do not have *all* of the necessary credentials (e.g. MCAT scores, final transcripts, and letters of recommendation) at the time of applying for admission, lessen their opportunity for admission since the Committee on Admissions begins its consideration of candidates as soon as applications are received.

College Credit Required

The applicant should present a broad general education including a major in some field, not necessarily a natural science. The Admissions Committee needs evidence of excellence of academic performance and steady progress toward a goal.

An excess of credit hours or higher degrees does little to offset the disadvantages of low grades in securing admission to the School of Medicine. The practice of repeating courses to raise the grade is discouraged. Applicants who have been subject to suspension from the WVU or other medical schools can be admitted only in very exceptional cases and at the discretion of the Committee on Admissions.

English	1 year
Biological Sciences (with laboratory)	1 year
Inorganic Chemistry (with laboratory)	1 year
Organic Chemistry (with laboratory)	1 year
Physics (with laboratory)	1 year
Social or Behavioral Sciences	1 year

A total of 90 semester hours of work, exclusive of Military Science (ROTC) or Air Force Aerospace Studies (ROTC) and Physical Education, is required.

It is recognized that applicants for medical school may have very diverse undergraduate backgrounds with a variety of majors. While many undergradu-

ate courses, aside from the required prerequisites, might be beneficial in providing additional background for medical school, the choice of such courses should be determined by the academic strengths and weaknesses of the particular applicant.

Medical College Admission Test

The scores of the Medical College Admission Test (MCAT) are used by the Admissions Committee in considering an applicant for admission. For this reason, it is strongly recommended that students take the test in the spring prior to making application for admission. Delaying the test until fall, even though all science courses may not have been completed, jeopardizes an applicant's opportunity since no final consideration is given until MCAT scores are obtained by the Admissions Committee. Information concerning the time and place of the test can be obtained from your premedical adviser or committee, or by writing to: Medical College Admission Test, The Psychological Corporation, 304 East 45th Street, New York, NY 10017.

Personal Interview

Each applicant is interviewed by members of the Admissions Committee before a final decision is made on any application. The applicant is notified of the time and place of the interview. Interviews and consideration of applicants begin in September.

Admission to Advanced Standing

Increasing numbers of inquiries are being received seeking consideration of enrollment in the WVU School of Medicine with advanced standing. Only a limited number of such requests can be processed. Transfer ordinarily will be considered only at the end of the second year. The applicant must have passed Part I of the National Board of Medical Examiners examination and present certification of good standing in the school from which the student is transferring.

Examinations and Evaluation of Student Progress

It is the policy of the School of Medicine that the several departments conduct examinations of various types from time to time to help in the overall evaluation of student progress. A satisfactory or unsatisfactory designation is formally recorded for each course. In addition, each department files in the office of the Dean a narrative evaluation of the work of each student identifying strengths and weaknesses and suggesting remedial or corrective measures, if appropriate.

In addition to departmental examinations, which help serve as a basis for recording grades in individual courses, other examinations may be conducted at times for other purposes. At the end of the first year a comprehensive examination, designed on an interdepartmental basis, may be required as a test of readiness for promotion. National Board of Medical Examiners, Part I, examinations are given as part of the testing of achievement in individual disciplines and are incorporated in the final grade for that course. The student is encouraged to take the full Part I examination near the end of the second year. The Part II examination is taken as a comprehensive test in clinical science at the end of

the third year and results are incorporated in the final grades for clinical clerkships.

The overall performance of the student in the National Boards will be taken into account by the Academic Standards Committee when considering decisions regarding promotion, and by the faculty when making the official recommendation for granting degrees.

All states require that physicians be licensed to practice medicine. Satisfactory completion of all portions of the National Board of Medical Examiners examination is one mechanism by which a license may be obtained.

Promotions and Suspensions

The Academic Standards Committee administers the promotions and suspension rules. Exceptions may be made only on recommendation of the committee. The application of rules on suspension is not automatically changed by removal of I grades or by the repetition of courses in other medical schools. Permission for repetition of work in the School of Medicine may be granted only by the Academic Standards Committee.

1. A student who does not satisfactorily complete at least one-half of the registration hours in any semester is automatically dismissed.

2. No student will be permitted to register for any work of the second or any subsequent year until all courses for the year before have been completed successfully.

3. All courses and all classes at the School of Medicine are graded as Satisfactory (S) or Unsatisfactory (U) at the completion of the course in lieu of other letter grades. The S and U designation is accompanied by a narrative report of the student's progress and any factors requiring remedial work or counseling. The U shall be regarded as a failing grade and all University regulations regarding a failed course shall then apply.

4. Notwithstanding the above rules, a student whose performance has been considered unsatisfactory by the Academic Standards Committee may be required as a condition for advancement or graduation to complete special requirements and/or an extended period of study. Such a requirement or special opportunity may be made available to a limited number of students at the discretion of the Academic Standards Committee.

5. A student whose performance has been determined by the Academic Standards Committee to be uniquely outstanding, may be offered an opportunity for a special schedule and accelerated advancement.

6. Upon concurrent recommendation of the Admissions Committee, the Academic Standards Committee, and the departments concerned, a limited number of students may be admitted to the School of Medicine to follow a special schedule reflecting the students' individual needs that could involve either an extended or shortened period of study to complete requirements for the M.D. degree.

Incomplete Courses

The grade of I is given when the instructor believes the work is unavoidably incomplete or that a supplementary examination is justifiable. If a grade of I is not removed by satisfactory completion of the work before the end of the next semester in which the student is in residence, it becomes a failure unless special permission to postpone the work is obtained from the Academic Standards

Committee (University rule). It is the responsibility of the student to consult the instructor about the means and schedule for making up incomplete courses.

Departure From Scheduled Work

Medical students must register for all prescribed courses for each semester, except by special permission from the Academic Standards Committee of the School of Medicine. This permission is not valid until it has been reported to the Assistant to the Dean of Admissions and Records, Medical Center, for record.

Honor Code

Students in the School of Medicine agree to abide by the provision of an honor code which requires ethical and moral standards of conduct in all situations.

University Hospital and Outpatient Clinics

University Hospital and its outpatient clinics opened in the summer of 1960. It is dedicated to the education of students in the multiple disciplines of the health fields and to the advancement of knowledge in the sciences and arts concerned with health and illness.

Specialist services at University Hospital are provided through the staff of the clinical departments of the School of Medicine.

There are also facilities and staff for clinical laboratory service, diagnostic and therapeutic X-ray services, and such special examinations as electrocardiography, cardiac catheterization, and electroencephalography. Emergency facilities are available at all times.

Immunizations

It is required that during the first semester of the first year all students must complete certain prescribed immunization and diagnostic procedures.

Organizations

Graduates of the School of Medicine have a *School of Medicine Alumni Association* devoted to the interests of students and graduates and to the encouragement of scientific and professional progress among its members and the medical profession generally.

Student American Medical Association. This organization has a chapter among the students of this school. An Auxiliary provides opportunities for student wives to meet and work together.

Student National Medical Association. This organization has among its objectives assistance in the recruitment and retention of minority students.

Lectureships

Alumni Lectureship. Annually some outstanding physician is brought to the Medical Center under Alumni Association sponsorship to address the School of Medicine student body.

Gideon Stanhope Dodds Lectureship. A periodic lectureship, founded by a group of alumni and friends, honors Dr. Dodds, professor emeritus of histology and embryology.

Loans and Scholarships

Loans and scholarships are available for assistance of students who are short of funds, but who otherwise are well qualified. These are administered by the WVU Office of Student Financial Aids.

The following are considered in determining the amount of financial assistance a student may receive: (1) the income, assets, and resources of the student and/or the student's family, (2) support available to the student from other sources, such as prizes, other scholarships, veterans benefits, and repayable loans, and (3) the costs reasonably necessary for full-time attendance at the school. Application forms for financial assistance are sent to all entering students in early spring.

If there are any questions regarding financial assistance, students may write to Dr. David Z. Morgan, Chairman, Student Welfare Committee, c/o Linda Stankos, Department of Physiology and Biophysics, WVU Medical Center, Morgantown, WV 26506.

The West Virginia State Medical Association has established a fund from which there is granted \$1,000 each year to each of four deserving students in each class of the School of Medicine. Each recipient agrees to practice in a rural area of West Virginia for a period of time following the completion of education. Information is available from the Dean of the School of Medicine.

Scholarship Fund in Honor of Dr. Thomas L. Harris. This fund was established by the family of Anna M. Broida of Parkersburg in 1960. It is awarded to an outstanding student in surgery.

Claude Worthington Benedum Foundation Medical Scholarship. A fund has been granted yearly by the Foundation for the aid of medical students.

Joseph Collins Foundation Scholarships. Established in 1951 under a bequest of the late Dr. Collins, physician and pioneer neurologist, these scholarships provide financial support in varying amounts for needy and deserving students.

The Board of Regents Graduate Scholarships in the School of Medicine. Twenty-four medical scholarships are divided equally among the four medical classes and provide for the payment of tuition and registration fees. Eligibility depends upon academic rank above the seventy-fifth percentile among those in the entering class or score above the national median in the Medical College Admission Test. Each recipient must maintain an acceptable academic position.

The Carr Scholarship Fund. Established by the late Katherine Carr O'Dwyer, formerly of Fairmont and Wheeling, in memory of her parents. For students of medicine who need financial assistance. Available to four students each year. Recipients receive \$800 annually.

Charles Lively Memorial Loan Fund of the West Virginia State Medical Association. For bona fide residents of West Virginia in the second, third, or fourth-year classes of the School of Medicine. Limited to \$400 per year per student.

National Medical Fellowship, Inc. Grants are made to minority students in medical school.

SAMA Emergency Loan Fund. A fund of \$500, established in 1966, was made possible through the generosity of Sears Roebuck Foundation in cooperation with the Student American Medical Association.

J. C. Stickney Loan Fund. A fund of \$5,000 established in 1971 for medical students.

Rebecca Sallaz Revolving Loan Fund. For West Virginia residents in the School of Medicine. Established by her daughter, Mrs. O. E. White of Clarksburg.

AMA-ERF Loan Fund. The Educational and Research Foundation of the American Medical Association sponsors a program by which long-term loans at moderate rates of interest are made available to students who have completed the first semester of work in the School of Medicine. The maximum loan is \$1,500 per 12 months. Interest charges must be paid in full each year.

Robert Wood Johnson Foundation Scholarship. This scholarship, provided in the years 1972-76, is intended for women students, minority group students, or students from sparsely populated counties (under 50,000) in West Virginia.

Samson and Lillian Ewens Finn Scholarship Fund. Established by Sylvia Finn Gerstein in memory of her late parents. Primary criterion is need with preference given to third-year students.

Floral F. Dodson Scholarship. This scholarship pays tuition and other expenses of worthy young men who are natives of Roane County, West Virginia, and graduates of a Roane County high school.

Health Professions Student Assistance Program. This program, which is the primary source of financial assistance through the federal government, provides both loan and scholarship money to participating institutions. The maximum award for health professions student loans and health professions scholarships is \$3,500 each, per *academic* year. For students enrolled in school that have a required course of study longer than the traditional nine-month academic year, the maximum amount of the loan and/or scholarship is proportionately increased. Students are eligible to apply for a Health Professions *Loan* if: the student is (1) a citizen or national of the United States; (2) enrolled or accepted for enrollment in school as a full-time student pursuing a course of study leading to the M.D. degree, and (3) in financial need. The interest rate is 3 percent and loans are repayable to the school over a 10-year period which begins one year after completion or otherwise the student ceases to pursue the full-time course of study. Interest begins to accrue at the time the loan becomes repayable. Students are eligible to apply for a Health Professions *Scholarship* if the student is (1) a citizen or national of the United States; (2) enrolled as a full-time fourth-year student pursuing a course of study leading to the M.D. degree, and (3) is in exceptional need. Scholarship ability also is a criterion.

Southern Medical Association Medical Student Scholarship. Established in 1970 in the amount of \$500 for partial payment of tuition for one or two entering medical students.

Northup Memory Medical Scholarship. A fund established in 1973 by the family of David W. Northup. Dr. Northup was Professor of Physiology and Biophysics.

William Morgan Winkler Loan Fund. Established by Dr. Henry J. Winkler as a memorial to his son. Loans limited to \$400 per year and open to students in medicine after the first semester of the curriculum.

West Virginia University Medical Loan Fund. Established in the amount of \$1,000 in 1963.

New York Life Insurance Company Medical Student Scholarship Program. One scholarship for the entering class beginning in the fall of 1966, and for each subsequent entering class, with annual renewals for recipients. It provides tuition, room, board, fees, books, and equipment for needy students.

John B. Finley Fund. A fund now totaling over \$1,500 was contributed by the trustees of the estate of John B. Finley of Pittsburgh, in accordance with his will, to be used for loans to deserving students in the School of Medicine.

SAMA Emergency Loan Fund. A fund of \$500, awarded in 1966, was made possible through the generosity of Sears Roebuck Foundation in cooperation with the Student American Medical Association.

Fayette County Medical Society Student Loan Fund. Established in the amount of \$2,300 in 1960. Loans limited to \$500 per year. First preferences to students from Fayette County, West Virginia, and third- and fourth-year students.

The E. J. Van Liere Loan Fund for Medical Students. Established in the amount of \$10,000 by the Alumni Association of the School of Medicine in 1960 in honor of Professor Emeritus Van Liere. Loans limited to \$600 per year. Open to all students enrolled in the School of Medicine.

The Kellogg Foundation Fund. The Kellogg Foundation in 1942 and 1958 allotted a total of \$15,000 to the University for loans to students of medicine. Loans may not exceed \$500 per year.

Howard T. Phillips Loan Fund. The late Dr. H. T. Phillips of Wheeling set aside in his will a grant of approximately \$1,000 for loans to deserving and needy students in the School of Medicine.

Thomas E. Pyles Memorial Loan Fund. This fund of \$186 was established in memory of Thomas E. Pyles who died during his first year in the School of Medicine. This fund is used for short-term emergency loans.

Family Practice Loan Fund. Established in the amount of \$1,000 by the West Virginia Academy of Family Practice in 1961. Loans in the amount of \$100 per semester (but not exceeding \$500 total) may be made to any student in the School of Medicine.

Federal Scholarships. These currently include the various branches of the military services and the Public Health Service. They provide tuition, fees, books, and a living allowance. They are repaid by services as a physician following graduation. These scholarships are not administered by the WVU Financial Aids Office.

George D. Hott Medical Scholarship. Established by George Hott in memory of his father, Dr. David F. Hott, who for many years, practiced in Morgantown. The award is made to a deserving and able West Virginia resident by the Student Welfare Committee.

Awards

The *Van Liere Award* was stimulated by the interest in students and in student research so strongly manifested by Dr. Edward J. Van Liere, professor emeritus of physiology at WVU. The award is given to the medical student who, in the opinion of a student faculty committee, has made the most excellent presentation of original research at the annual student research convocation. The award consists of an engraved medal and a cash award of \$100.

The *Edward G. Stuart Memorial Award* is presented to the senior medical student who "best exemplifies the qualities of empathy and understanding and strengthens his competency with compassion."

The *Lindsay Award* is presented by Dr. Hugh A. Lindsay, in memory of his parents, to a first-year student for outstanding academic performance in medical physiology.

Lange Book Awards are presented to two members of each class for scholastic achievement. The award consists of any two books published by Lange Medical Publications.

Merck Manual Awards are given to two members of the senior class for scholastic achievement. The award consists of a copy of the Merck Manual of Diagnosis and Therapy imprinted with the recipient's name.

Mosby Book Awards are presented to five members of the sophomore class for scholastic achievement. The award consists of a certificate permitting selection of any one Mosby Book with catalog list price not exceeding \$30.00.

Roche Award, which consists of an engraved watch and scroll, is awarded to one member of the sophomore class for outstanding scholastic achievement.

Upjohn Award is presented to the senior medical student for "applied personal qualities — character-leadership," consisting of a plaque which carries a medallion, name of the recipient, appropriate legend, name of school and year, together with cash award.

Milford L. and Marjorie R. Hobbs Award. Established in 1971, this award is made annually to the student achieving the best record in the pathology course of the second-year curriculum. Dr. Hobbs is a former professor of pathology in the School of Medicine.

CURRICULUM PLAN

First and Second Years

The plan of study is directed toward the principles and methodology of the medical basic sciences. However, the basic courses are designed so that the student begins to integrate concepts of patient care.

The student has the opportunity of an additional early exposure to patient-oriented instruction through the introduction to physical diagnosis and community medicine in the first term of the freshman year.

With the recognition that entering medical students have a wide variety of interests and backgrounds, elective opportunities are offered in the basic science years, beginning with the second term of the freshman year. The permissible elective courses or plans of study have broad limits and need not be confined to the Medical Center. The intention is to encourage responsible student initiative.

See Medicine I and Medicine II charts for representative schedules.

Third Year

A tightly-structured traditional third year gives the student a foundation in history-taking, examination, patient relations, laboratory aids, diagnosis, treatment, and use of the medical literature in the major clinical disciplines.

A number of third-year students may anticipate spending part of the year in specified clerkships at the Charleston Division of the WVU Medical Center or at other affiliated programs as designated by the faculty of the School of Medicine.

Fourth Year

The fourth year is selective. The student chooses one of three "tracks" and works with advisers at each track to select the individual program. The general

track is appropriate for: (1) the student pointing toward family practice, and (2) the student who has not selected a particular speciality interest.

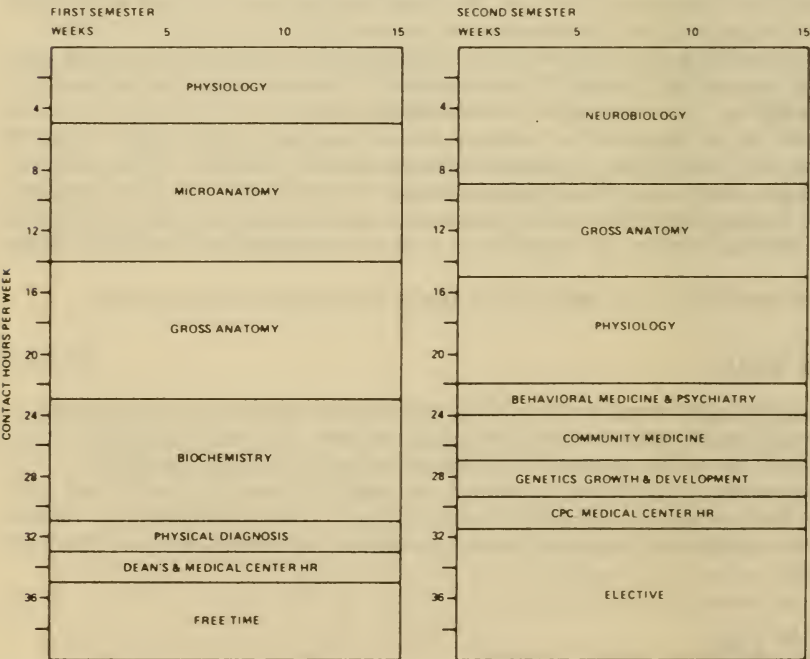
The student chooses a speciality track by department, and may already recognize an attraction to a sub-speciality within that department. The research track offers opportunity to spend much of the fourth year in medical or biological research.

Twenty-four of the 48 weeks must be spent in intramural programs. In addition to programs on the Morgantown campus, the programs at the Charleston Division, WVU Medical Center, qualify as intramural. Designated programs at the Wheeling Division, WVU School of Medicine — and at the Veteran's Administration Hospital in Clarksburg — also may be considered intramural. A folder is available which lists the approved intramural selective options.

A special selective period of 16 weeks may be spent in extramural programs. The Joint Council of Teaching Hospitals, working with physicians in various communities, has developed extramural selective opportunities at a number of hospitals in West Virginia. A separate folder lists these extramural in-state electives. Alternatively, the special 16-week selective period may be spent at any university or university-affiliated hospital.

Every student has the opportunity for 8 weeks of vacation. The student may choose valuable medical experience for vacation time. The student may also combine vacation with special selective time to obtain a block of 24 weeks in extramural programs.

MEDICINE I



MEDICINE II

	FIRST SEMESTER			SECOND SEMESTER				
	WEEKS	5	10	15	WEEKS	5	10	15
CONTACT HOURS PER WEEK	4	PATHOLOGY						
	8							
	12							
	16							
	20	MICROBIOLOGY						
	24							
	28							
	32							
	36	BEHAVIORAL MEDICINE & PSYCHIATRY						
	CPC, MEDICAL CENTER HR.							
	ELECTIVE							

	FIRST SEMESTER			SECOND SEMESTER				
	WEEKS	5	10	15	WEEKS	5	10	15
CONTACT HOURS PER WEEK	4	PATHOLOGY						
	8							
	12							
	16							
	20	PHARMACOLOGY						
	24							
	28							
	32							
	36	PHYSICAL DIAGNOSIS						
	BIOSTATISTICS							
	HISTORY OF MEDICINE							
	CPC, MEDICAL CENTER HR.							
	ELECTIVE							

MEDICINE III Clerkships

WEEKS	
12	MEDICINE
12	SURGERY
12	BEHAVIORAL MEDICINE & PSYCHIATRY
	OBSTETRICS-GYNECOLOGY
12	NEUROLOGY
	PEDIATRICS
	NEUROLOGY, PEDIATRICS, OPD, VACATION
48	TOTAL

MEDICINE IV

Three Alternative Tracks

WEEKS	GENERAL	SPECIALTY	RESEARCH
8	VACATION	VACATION	VACATION
12	SPECIAL SELECTIVE ADVISORY GROUP CONCURRENCE	SPECIAL SELECTIVE DEPARTMENT CHAIRPERSON CONCURRENCE	SPECIAL SELECTIVE ADVISORY GROUP CONCURRENCE
8	CLINICAL NEURO SCIENCES BEHAVIORAL MEDICINE AND PSYCHIATRY RADIOLOGY OB GYN OR PATHOLOGY INCLUDING CLINICAL PATHOLOGY	DEPARTMENT CHAIRPERSON APPROVAL	ADVISORY GROUP APPROVAL
8	MEDICINE AND/OR PEDIATRICS INCLUDING SUB SPECIALTY UNITS		
8	SURGERY INCLUDING SUB SPECIALTY UNITS		
4	ACUTE AND AMBULATORY CARE		
48	TOTAL		

Courses of Instruction

Anesthesiology

Professor Knapp (*Chairman*); Associate Professors Burke, Rodman, and Tercan; Assistant Professors Maewal, Remen, and Shaw; Assistant Research Professor Smith; Instructors Ahn and Kessel; Fellow-Instructor Capan.

361. *Basic Sciences Applied to Anesthesia — Medicine I and II.* 1-6 hr. per yr. PR: Consent. Physiology and pharmacology related to anesthesia.

399. *Clinical Anesthesiology.* Participation in all aspects of anesthetic management and care. Operating room, recovery room, intensive care unit, conferences, seminars and rounds. Offered continuously. Duration: 4 weeks. Maximum enrollment: two.

Intensive and Respiratory Care. Direct participation in all aspects of intensive and respiratory care. Laboratory methodology. Measurement of ventilatory and circulatory parameters. Ventilator use and management. Offered continuously. Duration: 4 weeks. Maximum enrollment: two.

Anesthesiology Research. Participation in ongoing clinical and laboratory projects. Ventilatory studies; effects of drugs including anesthetics on catecholamines and neural transmission; research with benzodiazepine derivatives on memory, learning, amnesic response and hypnotic effects. Development of new post-operative antiemetic drugs. Offered by arrangement. Duration: 4-24 weeks. Maximum enrollment: two.

Behavioral Medicine and Psychiatry

Professors Spradlin (*Chairman*), Carter, Flink, Hein, Kelley, and Quarrick; Clinical Professors Bateman, Carruth (Psychology), Schein (Biology), and Work; Clinical Associate Professors Bracco, Comer (Psychology), Edwards, Goodman (Psychology), Hibbard, Panepinto, Srebalus (Counseling and Guidance), Staples, Wanner, Ward, and Weise; Assistant Professors Clayman, Cone, Hlusko, Linton, McCauley, Morgan, Porterfield, Stevenson, Upthegrove, and Withersty; Clinical Assistant Professors Capage, Cavior (Psychology), Curtis, Dunning (Biology), Fawley, Johnson, Kovacevich, Ledwell, McNeer, Portz, Self, and Smith; Instructors Brallier, Claude, Miller, and Starkey; Clinical Instructors Case, Hunter, and R. Panepinto.

311. *Introductory Psychiatry. (First Year).* 1 hr. Clinical syndromes with discussion of various patterns and defense mechanisms.

312. *Behavioral Medicine and Psychiatry Outpatient Department Practicum. (First Year.)* 2 hr. PR: Beh. Med. & Psychiat. 311 completed or in progress. Medical students perform supervised outpatient clinic interviews.

321. *Introductory Psychiatry. (Second Year).* 2 hr. Developmental, interpersonal, and intrapsychic aspects of distorted behavior patterns.

341. *Clinical Clerkship in Psychiatry. (Third Year).* CR. Required of third-year medical students. Full-time assignment to the inpatient service in psychiatry and participation in diagnosis and treatment of psychiatric disorders.

355. *Behavioral Science and Health Care.* Behavioral science applied to issues related to physical and mental health care. Variety of topics will be considered, such as study of interpersonal roles and games, various cultural "healing" practices, personal and social aspects of illness, family disorganization, and hospitals and related institutions.

399. *Selected Experiences (Fourth Year) in Behavioral Medicine and Psychiatry.* (See Conjoined Courses.)

Community Medicine

Associate Professors W. A. Morgan (*Acting Chairman*), Eckert, Hall, Krall, and Ortmeier; Clinical Associate Professors Staples and Wiles; Clinical Assistant Professors Davis, Fuller, and Holland.

312. *Community Medicine. (First Year.)* II. 3 hr. Also open to nonmedical students. PR: Consent. The determinants of states of health in a community: interrelationship of demography, economics, sociology and anthropology, environmental and occupational hazards, and the organization of public health and medical care systems.
322. *Biostatistics and Evaluation of Medical Literature. (Second Year.)* II. 2 hr. For medical students only. PR: Consent. Statistical analysis of biologic phenomenon as related to medicine. Emphasis on descriptive statistics, epidemiology, distributions, statistical inference, and measures of association.

Conjoined Courses

399. *Selective Experiences in Medicine. (Fourth Year.)* I, II. S. CR. PR: Satisfactory completion of first three years of the medical curriculum. (Graded as S or U) The selective program offers a wide range of opportunities in the basic sciences, medical specialties, and sub-specialties, and in family medicine. The year is composed of twelve 4-week blocks. Six must be spent at the WVU Medical Center in Morgantown and approved programs at the Charleston Division, WVU Medical Center, the Wheeling Division, WVU School of Medicine, and the Veterans Administration Hospital, Clarksburg. The remainder may be spent at community hospitals in West Virginia, or at university or university-affiliated hospitals out-of-state. Each student plans an individual program, with faculty advice. Flexibility is permitted. With consent of instructors concerned, the student may, during the year, alter the selective choices. The student must give five weeks' notice before changing an intramural or extramural selection. (See intramural and extramural folders, published annually, describing the selective opportunities.)

Family Practice

Professors Traubert (*Chairman*), Sleeth, and Tully; Clinical Associate Professor Dunn; Clinical Assistant Professors Burke, Carper, Crigger, Eckmann, Fuller, and Jackson; Instructor Weissner; Clinical Instructor Howes.

399. *Selected Experiences (Fourth Year) in Family Practice.* (See Conjoined Courses.)

Medicine

Professors Flink (*Chairman*), Albrink, Anderson (*Chairman, Division of Gastroenterology*), Andrews, Bowyer, Jones, Klainer (*Chairman, Division of Infectious Diseases*), Lindholm (*Chairman, Division of Nephrology*), Lizarralde, Marshall (*Chairman, Division of Cardiology*), D. Morgan, K. Morgan (*Chairman, Division of Pulmonary Diseases*), Saville (*Chairman, Division of Rheumatology*), Sleeth, Welton (*Chairman, Division of Dermatology*), and Wong; Associate Professors Chen, Davidson, Hall, Jain, Krall, Lipp, Lewis, W. Morgan, Ramanan (*Acting Chairman, Division of Hematology*), Shane (*Chairman, Division of Metabolism and Endocrinology*), and Staples; Assistant Professors Dayton, Jewson, LeFrock, Lynch, Maewal, Make, E. Morgan, Murphy, O'Brien, Ortmeier, Shultz, Steffes, Ullrich, and Weiss (*Chairman, Division of Oncology*); Instructors Graham, Monta, Scobbo, and Swan; Clinical Professors Selinger, Skaggs, and Wil-

non: Clinical Assistant Professors Ann. Carter, Conley, Gorman, Hartman, Jackson, and R. Jones (Chief, Medical Services, Charleston VA Hospital), Koppel, McCutcheon, McMillan, Newman, Pfister, Rushman, Scherr, and White; Clinical Assistant Professors Blumhagen, Chavira, English, Garner, Holland, Hyde, Jacob, McConnell, Penn, Rudy, Sederman, and Thompson; Clinical Instructors Chok, Gomez, R. Gustaf, S. Gustaf, Lee, Lin, and Spiggle; Professor Emeritus Whittlesey.

121. *Physical Diagnosis. I. (Second Year). 4 hr.* Examination of normal subjects. Practical experience in history-taking and physical examination of patients.

122. *History of Medicine. I. (Second Year). 3 hr.* Development of the art and science of medicine.

123. *Clinical Clerkship in Medicine. (Third Year). CR.* Required of third-year medical students. The individual student is assigned responsibility for specific patients from the hospital or out-patient service of the respective department in which the student is serving at the time. The student is an integral part of the team providing diagnostic and treatment services needed by the patient, under direct supervision of members of the faculty of the department. The student elicits the patient's history, performs physical examinations, and performs or secures indicated laboratory and clinical studies. The student records findings and presents case reports for discussion by members of the faculty during hospital rounds or out-patient clinics. The student attends such staff conferences, etc., as directed by the several departments. Clerkship in medicine occupies 12 weeks.

124. *Selected Experiences (Fourth Year) in Medicine.* (See Electives — Subinternships in General Medicine and Specialties.)

Neurology

Professors Gorman (Chairman), Chou, Martin, and Thompson; Associate Professors Farkas and Gurewitz; Assistant Professors Azzam, Svitkova, and County; Clinical Assistant Professor Paffenbarger; Clinical Assistant Professor Pratt.

125. *Clinical Clerkship in Neurology. (Third Year). CR.* Required of third-year students. Basic fundamentals of the neurological evaluation and neurological diseases. Evaluation and treatment of hospitalized patients and out-patients with neurological illnesses performed under supervision of attending and resident physicians. Conferences and correlative instruction in neuropathology and neurophysiology.

126. *Selected Experiences (Fourth Year) in Neurology.* (See Contained Courses.)

Obstetrics and Gynecology

Professors White (Chairman) and Fager; Assistant Professor Butcher; Clinical Professor Bonney; Clinical Associate Professors Behman, Chambers, Grubb, Marx, Palladino, Pons, and Stone; Clinical Assistant Professors Cornette, Cron, Kerr, Sims, Stevens, and Thompson; Clinical Assistants Gruskin and Strader; Clinical Instructor Warfager; Research Associate McCafferty; Adjunct Instructor Genovese.

127. *Clinical Clerkship in Obstetrics and Gynecology. (Third Year).* Presents fundamental knowledge of Ob-Gyn necessary for any physician. Small group seminars, rounds, journal clubs, and didactic teaching sessions are conducted by faculty, house staff, and students. The students provide care for all patients, playing an essential role in running the service. Part of a programmed course is being introduced emphasizing audiovisual aids to supplement standard texts.

399. *Selected Experiences (Fourth Year) in Obstetrics and Gynecology.* Externship in Ob-Gyn with major responsibility for patient care, under supervision of residency staff. The senior student performs as a teacher and clinician.

Pediatrics

Professors Klingberg (*Chairman*), B. Jones (*Assistant Chairwoman*), Kelley, Khoury (*Chairman, Pediatric Cardiology*), and Pomerance; Associate Professors H. Eckert, Fakadej, Phillips, and H. Thompson; Assistant Professors N. Gutrecht, Hahon, Neal, C. Ramanan, W. Svoboda, N. Wanderman, and Wible; Instructors M. Sutherland and D. Wangelin; Clinical Associate Professors Harrison, Jakubec, Nottingham, Potterfield, and Stabins; Clinical Assistant Professors Crittenden, Ghofrani, and Shawkey; Clinical Instructor A. Munoz and J. Wolf.

314. *Human Growth and Development. (Second Year.)* Basic considerations of embryology, organogenesis, teratology, and other factors influencing intrauterine growth and development and the adaptation of the fetus to extrauterine life.
331. *Clinical Clerkship in Pediatrics. (Third Year.)* CR. Required of third-year medical students. See description of clinical clerkship under Med. 331. Clerkship in Pediatrics occupies 6 weeks.
370. *Genetics. (Second Year.)* Introduction to the understanding of genetics and heritable diseases in man.
399. *Selected Experiences in Pediatrics. (Fourth Year.)* (See Conjoined Courses.)

Radiology

Professor Gabriele (*Chairman*), Associate Professor Amtey; Assistant Professors Antico, Asaro, and Hogan; Clinical Associate Professor Shaffer; Clinical Assistant Professors Goodwin, Hayes, Jennings, Sexton, and Williams; Instructors Aragones, Ko, and Renner; Research Associate Lai.

The radiology staff aids in the instruction of students at all levels of the curriculum. They assist in the teaching of topographic anatomy in the first year. The careful interpretation of roentgenographs is an integral part of each clinical service.

101. *Radiology.* Selected experiences in general radiology.
102. *Neuroradiology.* Review of neuroanatomy with respect to application in neuroradiology. Selected experiences in neuroradiology.
103. *Cardiovascular Radiology.* Review of anatomy and embryology. Selected experiences in central and peripheral vascular radiology.
104. *Radiologic Physics.* Application of physics and mathematics to radiology, nuclear medicine, and radiation therapy.

Surgery

Professors Watne (*Acting Chairman*), Warden (*Vice-Chairman*), Chou, Clark (*Chairman, Division of Orthopedics*), Jones, Milam (*Chairman, Division of Urology*), Moran, Nugent (*Chairman, Division of Neurosurgery*), Sprinkle (*Chairman, Division of Otolaryngology*), Tarnay, R. Trotter (*Chairman, Division of Ophthalmology*), and Zimmermann; Clinical Professors Bradford, Dickenson, Gilmore, S. S. Hall (*Emeritus*), Hershey, Miller, and Pickett; Associate Professors Davis, Easley, Gardner, LaPlante, Lass, and Veltri; Clinical Associate Professors Bowers, Ghaphery, McConnell, J. Trotter, and Wiley; Assistant Professors Bon-

nabeau, Colasanti, Cody, Jewson, Kandzari, Kohn, Mawhinney, and Nunnery; Clinical Assistant Professors Bryant, Cather, Chicklo, Cipicic, Griswold, T. Hall, Haislip, Hatfield, Jadali, Jaquiss, Johnson, Kamerer, King, Lim, Malone, Mathias, Mehta, Mendoza, W. Morgan, Jr., Nichols, Oliverio, Paine, Spencer, Srifueng-fung, Whitaker, and Wilson; Instructors Armanious, Durning, Flowers, Martin, Peters, Sherman, Untalan, and Waddell; Clinical Instructors Cadogan, Cipicic, Hatfield, Lee, Lim, Linger, Spencer, Thrush, Walker, and Whitaker.

301. *Introduction to Laboratory Animal Experimentation*. I. 3 hr. One lab. Lecture and laboratory course in environmental control, biology, and diseases of laboratory animals. Uses as animal models and techniques of handling, specimen collection, anesthesia, and surgery.
341. *Clinical Clerkship in Surgery (Third Year)*. CR. Required of third-year medical students. Clinical clerks are assigned responsibility for hospitalized surgical patients under supervision of house staff and attending surgeons. Students are an integral part of the team providing diagnostic and treatment services and are expected to take histories, perform physical examinations, and participate in ward and laboratory procedures. A course of surgical lectures, designed to outline surgical core curriculum, is given concurrently. The student is expected to attend the daily rounds and conferences arranged by the department.
399. *Selected Experiences (Fourth Year) in Surgery*. (See Conjoined Courses.)

Faculty

- Ernest L. Abernathy, M.D. (Emory U.), *Clinical Associate Professor of Pathology*.
- Jerrold L. Abraham, M.S. (U. Cal.), *Instructor in Pathology*.
- Kyung Mi Ahn, M.D. (Ewha Wom. U. Med. Sch.), *Instructor in Anesthesiology*.
- Margaret J. Albrink, M.D. (Yale U.), *Professor of Medicine*.
- Wilhelm S. Albrink, Ph.D., M.D. (Yale U.), *Professor of Pathology*.
- Sharad Amtey, Ph.D. (Vanderbilt U.), *Associate Professor of Radiology*.
- William E. Anderson, M.D. (U. Minn.), *Associate Professor of Medicine; Chairman, Division of Gastroenterology*.
- Charles E. Andrews, M.D. (Boston U.), *Professor of Medicine; Provost-Health Sciences*.
- Vicente Anido, M.D. (Havana U.), *Professor and Chairman, Division of Clinical Pathology; Educational Coordinator, Division of Medical Technology*.
- Dominic A. Antico, M.D. (U. Chi.), *Assistant Professor of Radiology*.
- Peter C. Aragonés, M.D. (U. East), *Instructor in Radiology*.
- Adel W. Armanious, M.B.B.Ch. (U. Cairo), *Instructor in Surgery*.
- Steven A. Artz, M.D. (Syracuse U.), *Clinical Associate Professor of Medicine*.
- Joseph R. Asaro, M.D. (U. Palermo), *Assistant Professor of Radiology*.
- Albert J. Azzaro, Ph.D. (WVU), *Assistant Professor of Neurology and Pharmacology*.
- Mildred Bateman, M.D. (Wom. Med. C. Penn.), *Clinical Professor of Behavioral Medicine and Psychiatry*.
- Kamal M. Behnam, M.B. (U. Cairo), *Clinical Associate Professor of Obstetrics and Gynecology*.
- William A. Beresford, Ph.D. (Oxford U.), *Associate Professor of Anatomy*.
- James B. Blair, Ph.D. (U. Va.), *Assistant Professor of Biochemistry*.
- Donald M. Blatchley, M.D. (Jeff. Med. C.), *Clinical Assistant Professor of Medicine, Dermatology*.
- Raymond C. Bonnabeau, M.D. (U. Minn.), *Assistant Professor of Surgery*.
- Walter A. Bonney, Jr., M.D. (Columbia U.), *Clinical Professor of Obstetrics and Gynecology*.

- K. Douglas Bowers, Jr., M.D. (Jeff. Med. C.), *Clinical Associate Professor, Orthopedics (Surgery).*
- Allen F. Bowyer, M.D. (Loma Linda U.), *Professor of Medicine, Cardiovascular and Pulmonary Diseases.*
- Richard A. Bracco, M.D. (NYU), *Clinical Associate Professor of Behavioral Medicine and Psychiatry.*
- Bert E. Bradford, M.D. (Wash. U.), *Clinical Professor of Surgery.*
- Nancy K. Braillier, M.S.W. (WVU), *Instructor in Behavioral Medicine and Psychiatry.*
- Paul Brown, Ph.D., (U. Chi.), *Assistant Professor of Physiology and Biophysics.*
- James Bryant, M.D. (WVU), *Clinical Assistant Professor of Surgery, Otolaryngology.*
- Arnold C. Burke, M.D. (U. Ala.), *Clinical Assistant Professor of Family Practice.*
- Simpson S. Burke, M.D. (Harvard U.), *Associate Professor of Anesthesiology.*
- Robert G. Burrell, Ph.D. (Ohio St. U.), *Professor of Microbiology.*
- Roy L. Butcher, Ph.D. (Iowa St. U.), *Assistant Professor of Obstetrics and Gynecology; Associate Professor of Anatomy.*
- Eusebio G. Cadogan, M.D. (Natl. U. Asuncion), *Clinical Instructor in Surgery.*
- Bobby Lee Caldwell, M.D. (Bowman Gray Sch. Med.), *Clinical Assistant Professor of Pathology.*
- William M. Caldwell, Jr., B.S.E.E. (U. Ky.), *Lecturer in Physiology and Biophysics.*
- William J. Canady, Ph.D. (G. Wash. U.), *Professor of Biochemistry.*
- James Capage, Ph.D. (Ohio U.), *Clinical Assistant Professor of Behavioral Medicine and Psychiatry.*
- Levon M. Capan, M.D. (Istanbul U.), *Fellow and Instructor in Anesthesiology.*
- Stephen W. Carmichael, Ph.D. (Tulane U.), *Assistant Professor of Anatomy.*
- Marshall J. Carper, M.D. (Med. C. Va.), *Clinical Assistant Professor of Family Practice.*
- James F. Carruth, Ph.D. (U. Ill.), *Clinical Professor of Behavioral Medicine and Psychiatry and Psychology.*
- Donald C. Carter, M.D. (U. Nebr.), *Professor of Behavioral Medicine and Psychiatry.*
- William H. Carter, M.D. (U. Va.), *Clinical Associate Professor of Medicine.*
- Walter A. Case, M.S.W. (WVU), *Clinical Instructor in Behavioral Medicine and Psychiatry.*
- Carl H. Cather, Jr., M.D. (Harvard U.), *Clinical Assistant Professor of Surgery.*
- Norman Cavior, Ph.D. (U. Houston), *Clinical Assistant Professor of Behavioral Medicine and Psychiatry.*
- Richard J. Cenedella, Ph.D. (Jeff. Med. C.), *Associate Professor of Pharmacology.*
- John T. Chambers, M.D. (West. Res. U.), *Clinical Associate Professor of Obstetrics and Gynecology.*
- Nyles Charon, Ph.D., (U. Minn.), *Assistant Professor of Microbiology.*
- Stuart T. Chen, M.D. (Nat'l. Taiwan U.), Ph.D. (U. Minn.), *Associate Professor of Medicine (Gastroenterology).*
- James M. Chicklo, M.D. (U. Va.), *Clinical Assistant Professor of Surgery (Otolaryngology).*
- Shi-Ming (Samuel) Chou, M.D. (Nat'l. Taiwan U.), Ph.D. (U. Wisc.), *Professor of Pathology (Neurology and Surgery) (Neurosurgery).*
- Thomas E. Chvasta, M.D. (U. Pitt.), *Clinical Assistant Professor of Medicine.*
- Joseph A. Cipic, M.D. (U. Pitt.), *Clinical Assistant Professor of Surgery (Otolaryngology).*
- Robert N. Clark, M.D. (U. Penn.), *Professor and Chairman of Surgery (Orthopedics).*
- John P. Claude, M.S.W. (WVU), *Instructor in Behavioral Medicine and Psychiatry.*
- David Clayman, Ph.D. (U. Vt.), *Assistant Professor of Behavioral Medicine and Psychiatry.*
- Robert C. Cody, M.A. (U. Iowa), *Assistant Professor of Surgery (Otolaryngology).*
- Brenda K. Colasanti, Ph.D. (WVU), *Assistant Professor of Surgery (Ophthalmology and Pharmacology).*
- Howard D. Colby, Ph.D. (SUNY), *Assistant Professor of Physiology and Biophysics.*
- Philip E. Comer, Ph.D. (WVU), *Clinical Associate Professor of Psychiatry and Psychology.*

Janice W. Cone, M.S. (U. Denver), *Assistant Professor of Behavioral Medicine and Psychiatry.*

Francis W. Conley, M.D. (U. Iowa), *Clinical Associate Professor of Medicine.*

Charles R. Craig, Ph.D. (U. Wisc.), *Associate Professor of Pharmacology.*

William D. Crigger, M.D. (Temple U.), *Clinical Assistant Professor of Family Practice.*

William C. Crittenden, M.D. (Vanderbilt U.), *Clinical Assistant Professor of Pediatrics.*

Thomas W. Crosby, M.D. (WVU), *Assistant Professor of Neurology.*

James L. Culberson, Ph.D. (Tulane U.), *Associate Professor of Anatomy.*

Larry Curnutte, M.D. (WVU), *Clinical Assistant Professor of Obstetrics and Gynecology.*

Eleanor S. Curtis, A.M. (Oberlin C.), *Clinical Assistant Professor of Behavioral Medicine and Psychiatry.*

Paul Davidson, M.D. (U. Minn.), *Assistant Professor of Medicine.*

Charles M. Davis, Jr., M.D. (U. Penn.), *Associate Professor of Surgery.*

DelRoy R. Davis, M.D. (U. Wash.), *Clinical Assistant Professor of Community Medicine.*

Lang M. Dayton, M.D. (SUNY), *Assistant Professor of Medicine (Cardiovascular and Pulmonary Diseases).*

Samuel J. Deal, Ph.D. (U. Minn.), *Professor of Microbiology.*

Phillip B. DeNee, Ph.D. (Lehigh U.), *Research Associate in Pathology.*

John T. Dickinson, M.D. (U. Pitt.), *Clinical Professor of Surgery (Otolaryngology).*

Edward T. Dunn, M.D. (U. Va.), *Clinical Associate Professor of Family Practice.*

Dorothy C. Dunning, Ph.D. (Tufts U.), *Clinical Assistant Professor of Behavioral Medicine and Psychiatry.*

Robert Durning, M.D. (WVU), *Instructor in Surgery.*

Herbert L. Eckert, M.D. (U. Md.), *Associate Professor of Community Medicine and Pediatrics.*

Leonard M. Eckmann, M.D. (NYU), *Clinical Assistant Professor of Family Practice.*

Roy A. Edwards, Jr., M.D. (Med. C. Va.), *Clinical Associate Professor of Psychiatry.*

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Reita A. Troum, M.S.W. (Tulane U.), *Assistant Professor of Behavioral Medicine and Psychiatry.*

George P. Tryfiates, Ph.D. (Rutgers U.), *Associate Professor of Biochemistry.*

Christopher C. Tully, M.D. (Med. C. Va.), *Professor of Family Practice.*

Irma H. Ullrich, M.D. (U. Minn.), *Assistant Professor of Medicine.*

Rogelio Untalan, M.D. (U. S. Thomas, Manila), *Instructor in Surgery.*

Daniel Upthegrove, M.D. (WVU), *Assistant Professor of Behavioral Medicine and Psychiatry.*

Pedro Urquilla, M.D. (U. El Salv.), *Assistant Professor of Pharmacology.*

Knox Van Dyke, Ph.D. (St. Lou. U.), *Associate Professor of Pharmacology.*

Edward J. VanLiere, M.D. (Harvard U.), Ph.D. (U. Chicago), *Professor Emeritus; Research Professor, Obstetrics.*

Louise E. Van Riper, M.D. (WVU), *Clinical Instructor in Obstetrics and Gynecology.*

Robert W. Veltri, Ph.D. (WVU), *Associate Professor of Microbiology and Surgery (Otolaryngology).*

Herbert G. Voelz, Dr. Rer. Nat. (U. Greifswald, Ger.), *Professor of Microbiology.*

Elizabeth R. Walker, M.S. (WVU), *Lecturer in Anatomy.*

Diane L. Wangelin, M.A. (WVU), *Instructor in Pediatrics.*

Albert L. Wanner, M.D. (U. Pitt.), *Clinical Associate Professor of Behavioral Medicine and Psychiatry.*

Stephen D. Ward, M.D. (U. Pitt.), *Clinical Associate Professor of Behavioral Medicine and Psychiatry.*

Herbert E. Warden, M.D. (U. Chi.), Ph.D. (U. Ill.), *Professor and Assistant Chairman of Surgery.*

Alvin L. Watne, M.D. (U. Ill.), *Professor and Acting Chairman of Surgery.*

Kenneth C. Weber, Ph.D. (U. Minn.), *Associate Professor of Physiology and Biophysics.*

Harry S. Weeks, Jr., M.D. (U. Md.), *Clinical Associate Professor of Anesthesiology.*

Charles C. Weise, M.D. (U. Penn.), *Clinical Associate Professor of Behavioral Medicine and Psychiatry.*

Raymond B. Weiss, M.D. (U. Minn.), *Assistant Professor of Internal Medicine; Chairman, Division of Oncology.*

Roland J. Weissner, Jr., M.D. (WVU), *Instructor in Family Practice.*

William A. Welton, M.D. (U. Md.), *Professor and Chairman of Dermatology (Medicine).*

David P. Westfall, Ph.D. (WVU), *Associate Professor of Pharmacology.*

Charles E. Whitaker, M.D. (U. Pitt.), *Clinical Assistant Professor of Surgery (Otolaryngology)*.

Charles A. White, M.D. (U. Utah), *Professor and Chairman of Obstetrics and Gynecology*.

Frederick R. Whittlesey, M.D. (West. Res. U.), *Clinical Professor Emeritus of Medicine*.

Kenneth L. Wible, M.D. (Jeff. Med. C.), *Assistant Professor of Pediatrics*.

Isiah A. Wiles, M.D. (U. Chicago), *Clinical Associate Professor of Community Medicine and Medicine*.

James H. Wiley, M.D. (Med. C. Va.), *Clinical Associate Professor of Orthopedics (Surgery)*.

David H. Williams, M.D. (Cornell U.), *Clinical Assistant Professor of Radiology*.

T. Walley Williams, Ph.D. (U. Pitt.), *Professor Emeritus of Anatomy*.

Michael F. Wilson, M.D. (U. Penn.), *Professor and Chairman of Physiology and Biophysics; Clinical Professor of Medicine*.

Robert S. Wilson, M.D. (J. Hopkins U.), *Clinical Assistant Professor of Orthopedics (Surgery)*.

George H. Wirtz, Ph.D. (G. Wash. U.), *Professor of Biochemistry*.

David Withersty, M.D. (WVU), *Assistant Professor of Behavioral Medicine and Psychiatry*.

John J. Wolf, Jr., M.D. (W. Forest U.), *Clinical Instructor in Pediatrics*.

Edward T. Wong, M.D. (U. Minn.), *Professor of Medicine*.

Henry H. Work, M.D. (Harvard U.), *Clinical Professor of Behavioral Medicine and Psychiatry*.

David B. Yelton, Ph.D. (U. Mass.), *Assistant Professor of Microbiology*.

John F. Zeedick, M.D. (U. Pitt.), *Clinical Associate Professor of Anesthesiology*.

Bernard Zimmermann, M.D. (Harvard U.), Ph.D. (U. Minn.), *Professor of Surgery*.



Naturally-lighted entrance hall of the new \$3.8 million Law Center, opened in Fall, 1974.

Part 9

COLLEGE OF LAW

The College of Law was established in 1878 and is the oldest professional school at West Virginia University. Since 1912, graduation from the College has required the successful completion of three years of work within the College. Since 1914, the College of Law has been a member of the Association of American Law Schools and, since 1923, the College of Law has been approved by the American Bar Association.

The overall mission of the College of Law as a part of a state land-grant university is to promote the fair and efficient administration of justice. Its chief activity aimed at this goal is the conduct of a three-year program leading to the Juris Doctor degree. In cooperation with the West Virginia State Bar, the College of Law also conducts a program of Continuing Legal Education aimed primarily at the practicing lawyer in West Virginia. Research and public service activities emanating from the College of Law also are conducted in support of its overall mission.

The College of Law occupied in the fall of 1974 the Law Center, completed for its exclusive use. Generous and flexible classroom space afford a variety of teaching-learning areas. A combination courtroom-auditorium provides attractive and utilitarian surroundings for the strong trial practice orientation of the training program of the College of Law. Generous space is available for individual and group study as well as space for the support of law student activities.

Faculty

Willard D. Lorensen, A.B., LL.B., LL.M., *Professor, Dean, College of Law.*

T. Porter Hardman, M.A., LL.B., J.D., *Professor Emeritus.*

Stanley E. Dadisman, A.B., J.D., *Professor Emeritus.*

Robert T. Donley, A.B., J.D., *Professor Emeritus.*

Londo H. Brown, A.B., J.D., *Professor.*

Thomas C. Cady, B.A., LL.B., LL.M., *Professor.*

Vincent P. Cardi, B.A., J.D., *Associate Professor.*

Franklin D. Cleckley, A.B., J.D., LL.M., *Associate Professor.*

John T. Copenhaver, Jr., A.B., LL.B., *Lecturer.*

Rodolphe J. A. de Seife, A.B., J.D., LL.M., *Assistant Professor.*

John W. Fisher, II, A.B., J.D., *Assistant Professor.*

Patricia Hassett, B.A., LL.B., LL.M., *Assistant Professor.*

J. Patrick Heelen, A.B., J.D., LL.M., *Assistant Professor.*

Thomas L. Hindes, A.B., J.D., *Assistant Professor.*

William E. Johnson, A.B., J.D., M.L.L., *Associate Professor, Law Librarian.*

Gene G. Livingston, B.A., J.D., *Associate Professor.*

Marlyn E. Lugar, A.B., LL.B., J.S.D., *Professor.*

James A. McLaughlin, B.A., J.D., *Associate Professor.*

William O. Morris, A.B., J.D., *Professor.*

J. Timothy Philipps, B.S., J.D., LL.M., *Professor.*

Woodrow A. Potesta, A.B., J.D., *Lecturer.*

Frederick F. Schauer, A.B., M.B.A., J.D., *Assistant Professor.*

Paul L. Selby, Jr., B.A., J.D., *Professor.*

Law Library

The Law Library contains more than 90,000 volumes. It includes reports of the highest courts of all states, insular possessions, and the District of Columbia, with the exception of a few volumes no longer obtainable, together with published reports of the lower courts of various states; the National Reporter System, and reports of the Federal courts and commissions; selections of annotated cases; the American and the English encyclopedias of law; and the American Digest. It also contains reports of the English courts, as contained in the English Reprint and the Law Reports, as well as the Irish reports, the Scotch reports, and the more important Canadian and Australian reports; the English statutes and the statutes of the various states, as well as Federal statutory material, including more modern codes and compilations; a complete collection of codes and session laws of the Virginias from the time of early settlers; treatises and textbooks, representative fairly of the legal literature dealing with common law and with civil law, including a large amount of old English historical material.

There also are legal periodicals, an extensive collection of bar association reports and legal miscellany, and the briefs and records of cases decided by the Supreme Court of Appeals of West Virginia, now totaling more than 1,200 volumes.

Program of Instruction

Curricular Design

The primary goal of the College of Law educational program is to prepare the students for the general practice of law. For anyone who intends to practice law in West Virginia the program of the College offers unique advantages because local doctrine and local institutions are used as vehicles to develop an understanding of general legal principles where appropriate. Graduates of the College of Law successfully enter practice in many states and foreign countries and rise to positions of high responsibility in government and business.

In the fall of 1974, the College of Law completed a three-year transition to a new curriculum unique in its attempt to identify a separate and distinct educational goal for each of the three years in the traditional law school curriculum. The program moves from a first year of introduction to legal doctrine and legal method, with a heavy reliance on traditional case study techniques, to a second year aimed at a rapid broadening of the student's knowledge of legal doctrine, to a third year aimed chiefly at challenging the student to resolve complex problems involving the use of legal materials.

Requirements for Degree

The degree of Doctor of Jurisprudence will be conferred upon candidates who have met the requirements for entrance to the College of Law and who have satisfactorily completed, with a grade of D or better, courses aggregating at least 85 credit hours, distributed over a minimum of six semesters of residence (a semester in residence being defined to mean enrollment throughout a semester in courses totaling at least 13 credit hours) provided, that:

- (1) Except with the permission of the Committee on Academic Standing, the 85 credit hours must be taken in a maximum of seven semesters or the equivalent thereof in summer session;
- (2) A candidate admitted to the College of Law from another approved law school must satisfactorily complete, with a grade of D or better, courses aggregating at least 43 credit hours in the College of Law, be in residence in the College of Law for at least three semesters, and take the last 29 credit hours in the College of Law, and
- (3) A candidate must obtain an overall average of C computed on the basis of the first 85 credit hours taken, or on the basis of the work taken in the College of Law if admitted from another approved law school.

Academic Rules, Examinations, Grading

The College of Law operates on an honor system formally adopted by the student body in 1965. Enforcement of the system rests principally in the hands of the student body and infractions are investigated by the Student Ethics Council. A copy of the honor code is presented to each student admitted to the College of Law.

All courses extend either through the entire academic year or through one semester. No credit will be given for less than an entire course except by special order of the Committee on Academic Standing.

Final grades are based primarily on written examinations, but in determining a grade, the instructor may give such weight as the instructor deems best to daily recitations or other classroom assignments. The faculty ascribes to the principle that attendance is important and necessary to the successful study of law. Therefore, an instructor may refuse examination to a student because of poor class attendance. Furthermore, a student who is absent from as many as 25 percent of the scheduled class hours for any given course shall not be permitted to take an examination in the course except by special permission of the faculty.

As soon as circumstances permit, a student must notify the College of Law of any absence or anticipated absence from a regularly scheduled examination. Notification of absence before the time scheduled for the examination is required in any case in which such prior notification is possible.

A student who is absent from a regularly scheduled examination and who has given proper notification of such absence may petition the faculty for permission to take a deferred examination based upon showing that the absence was caused by dire circumstances beyond the student's reasonable control. If the petition is approved by the instructor whose examination has been missed and two-thirds of the full-time teaching faculty of the College of Law, the student will be granted permission to take a deferred examination. No deferred examination will be granted unless the petition for the deferred examination is timely made. If the petition is denied or no petition is timely made, the student will be given a failing grade in the course. A petition is considered timely made if filed in the Dean's Office as soon as possible after the circumstances which necessitated the absence have terminated.

The deferred examination shall be administered at a time as soon after the regularly scheduled examination as circumstances permit, with the time set by the faculty.

Only under very exceptional circumstances, the Committee on Academic Standing may exempt a student from taking a required course, or may permit a student to take a first-, second-, or third-year course in some other year. Neither fewer than 13 nor more than 16 hours may be carried in any one semester without the consent of the Committee on Academic Standing.

Averages are computed on the basis of numerical grades received by the students: A — 74-80; B — 67-73; C — 60-66; D — 53-59; F — 46-52, all categories inclusive.

A student who, at the end of the student's second semester or any subsequent semester, has not maintained an overall average of 60 or more, computed on the basis of the total number of hours which the student has taken, shall be excluded permanently from the College of Law; provided, that a student who completes the second semester with an overall average of above 59 or with more grades of C or better than D or less, may on petition, be readmitted to the third semester on probation conditioned upon bringing the student's overall average to 60 at the end of such third semester. Furthermore, a student who fails more than half the work taken during any semester in the College of Law shall be suspended and shall be required to petition the Committee on Academic Standing for permission to enter a further semester. The Committee on Academic Standing, based upon its judgment of the petitioner's ability and motivation to achieve the improvement required to attain an overall average of 60 at the end of the further semester, may allow such student's readmission upon such conditions as it deems best in all circumstances.

Any student who has been dismissed from the College of Law may petition the Committee on Academic Standing for permission to be readmitted, which permission may be granted if the following conditions have been met:

- (1) Two years must have elapsed from the date of dismissal to the date of such petition;
- (2) The overall average while in the College of Law was not less than 58; and
- (3) The student proves to the satisfaction of the Committee on Academic Standing that because of his additional maturity, potential aptitude, and educational or employment experience in the interim the student has a reasonable opportunity of bringing the overall average to 60 or higher by the end of the second semester after readmission.

Any student who has been readmitted to the College of Law may not repeat any course for credit that he has taken. Any such student who fails to bring the overall average to 60 or higher by the end of the second semester after readmission shall be dismissed permanently from the College of Law.

Law Courses for Graduate and Post-Graduate Students

Qualified graduate and post-graduate students from other colleges, schools, and divisions within the University may enroll for courses in the College of Law with the permission of the College of Law, and the college, school, or division within the University to which they are attached. Credit for such courses may be granted toward completion of the requirements for the student's graduate degree by such other college, school, or division, but in no case shall the College of Law grant credit toward the degree of Doctor of Jurisprudence for such courses. The total credit hours which a student may take under this provision is limited to 21. No student who has been excluded from the College of Law for

any reason, or if the student were applying for admission to the College of Law could not meet its admission requirements, shall be permitted to take courses in the College of Law under this provision.

In view of its public and professional responsibilities with respect to admission of candidates to the practice of law, the College of Law reserves the right to drop any student from the rolls whenever, by formal decision reduced to writing, the faculty finds that the student is unfitted to meet the qualifications and responsibilities of the legal profession.

Admission to Bar

West Virginia residents who receive the Doctor of Jurisprudence degree from WVU may be admitted to the bar without further examination with regard to their knowledge of the law. The College of Law has no control over this diploma privilege and cannot assure any student entering that the privilege will still be available at the time of the student's graduation.

All persons seeking admission to the West Virginia bar, except those who hold the degree of Doctor of Jurisprudence from WVU, are required to pass the state bar examination. Information about bar examinations and about other matters relating to admission to the bar may be obtained by contacting the Secretary, State Board of Law Examiners, Charleston, WV.

For students who may seek admission to the bar of other states, it is most important that they seek advice as to admission requirements from the Clerk of the Supreme Court or the Secretary of the Board of Law Examiners in the state or states in which they are interested. Need for early requests for information is emphasized by the fact that many states require law students to register with the Bar Examiners as early as within thirty days after commencement of law studies. Sometimes severe penalties in the form of increased fees or increased waiting periods are assessed for failure to so register.

Admission to College of Law

General

The College of Law admits students only in the first semester. A baccalaureate degree is a prerequisite to admission and at least 90 credit hours of the work leading to the baccalaureate degree must be accomplished in theory courses. All applicants for admission to the College of Law must take the Law School Admissions Test administered by Educational Testing Service, Box 944, Princeton, NJ 08540. Persons are admitted to the College of Law on the basis of previous academic performance, scores on the Law School Aptitude Test and such other factors as are determined by the College of Law as to bear upon the potential professional qualifications of the applicant. Application forms and more specific information regarding application requirements may be obtained by writing the College of Law, West Virginia University, Morgantown, WV 26506.

Suggestions on Pre-Law Study

No specific program of pre-legal education is prescribed. Courses of study which demand intellectual self-discipline are encouraged. The ability to speak and write clearly, ordering thoughts intelligently, and using language accurately

is highly desirable. Some background in accounting is helpful in understanding complex tax and corporate structure matters.

Admission Requirements for Students With Advanced Standing

To be eligible for consideration for admission with advanced standing, an applicant must satisfy the requirements stated in this *Catalog* pertaining to the admission of beginning students, must have successfully pursued the study of law in a school which, if in the United States, is a member of the Association of American Law Schools or, under extraordinary circumstances, a non-member law school approved or provisionally approved by the American Bar Association, and must have received credit for courses equivalent to those required of students in the College of Law. Such applicants must have received a cumulative average of at least C or its equivalent on all work taken at such other law school or law schools.

If a student desires to be considered for admission with advanced standing, that student must file an application for such admission together with a certified transcript of all college and law school work taken. In acting on such applications, the Committee on Admissions will consider the admission standards for beginning law students together with the academic record achieved by the applicant in the law school from which the transfer is requested and may require the applicant to submit appropriate supporting data.

In all cases where a student is admitted with advanced standing to the College of Law, the law school work which has been completed will be evaluated in light of the curricular offerings of the College of Law. The extent of credit allowed for work done elsewhere will be determined by the Committee on Admissions; however, a student will not be allowed credit for work carried in another law school unless the student receives thereon a grade of C or its equivalent, and in only exceptional cases will credit for such transferred work be in excess of 30 semester hours.

Special Service Fee

A special service fee of \$10.00 is required of each applicant for admission to the College of Law. This fee will not be returned under any circumstances, nor is it deductible against any other fee charged or other sum required of the applicant by the University. No application will be processed until this special service fee is paid.

When to Apply

Applications for beginning students for admission to commence law study in any year must be filed with the College of Law during the academic year preceding the anticipated date of enrollment, but in no event later than March 1 preceding the August of first enrollment. In no event will the deadline for filing applications be extended beyond the March 1 date.

SCHOLARSHIPS, AWARDS, PRIZES, LOAN FUNDS

Scholarships

Board of Regents Scholarships. In 1961 four annual scholarships for each class in the College of Law were established. Each scholarship entitles the

recipient to waiver or remission of all tuition and fees except those covering miscellaneous student activities and special services. These scholarships are awarded to students who established a reasonable case of need for financial help and who have demonstrated academic achievement and professional promise.

In awarding scholarships in the first-year class, special emphasis will be given to need for financial assistance; academic achievement and professional promise for members of this class will be weighed on the basis of the applicant's collegiate record, including extracurricular activities, but in no event will an applicant be considered unless the applicant was graduated with at least an overall B average. To be awarded a scholarship in the second or third year, a student must have a C+ average on law school work. A scholarship awarded to a student will be continued for the remaining year or years if the student's financial need continues unchanged and the student maintains a C+ average on work in the College of Law.

Clinton Ritter Law Scholarship. Clinton Ritter, Winchester, VA, businessman, whose son, Clinton R. Ritter, was graduated in May, 1970, from the College of Law, has established a full tuition-and-fees scholarship for law students. To be eligible, a law student must be a resident of Hampshire or Morgan counties, in West Virginia, or of Frederick County, Virginia. Other criteria are good moral character and demonstrated financial need. The award will be made by the Office of Student Financial Aids of the University, upon the recommendation of the College of Law Faculty Committee on Scholarships and Prizes.

Thurman Arnold Memorial Scholarship. A scholarship fund, donated by the Washington law firm of Arnold & Porter and alumni of the College of Law, has been created as a memorial to the late Thurman Arnold. Judge Arnold was Dean of the College of Law from 1927 to 1930. From here he went to Yale Law School as a member of that faculty, and then on to serve as Assistant Attorney General of the United States, as Judge of the United States Court of Appeals, and as a distinguished practicing lawyer as a senior partner in the Arnold & Porter law firm in Washington, DC. The income of the fund is used to provide tuition and fees scholarships for deserving residents of West Virginia who could not otherwise pursue their ambition to study law.

Frank Bliss Enslow Legal Scholarship Award. The late Mrs. Frank Bliss Enslow of Huntington provided in her will a trust fund in support of the Frank Bliss Enslow Legal Scholarship at the University. This annual award is restricted to students enrolled in the College of Law, and selection is made on the basis of ability, character, financial status, and scholarship qualifications. Recipients must be residents of West Virginia, and preference will be given applicants from Cabell County. The amount of the scholarship will be determined from year to year. A second-year man holding the scholarship award can repeat as its winner during his final year if conditions warrant.

Kay, Casto & Chaney Law Scholarship. The Charleston law firm of Kay, Casto & Chaney provides a \$500 scholarship each year for a worthy student in the law who is a West Virginia resident and who discloses outstanding promise as a future member of the legal profession. This scholarship is awarded each year on the basis of new applications made as hereafter provided.

Patrick Duffy Koontz Scholarship Awards. The late Patrick Duffy Koontz and Arthur Burke Koontz have donated to the University certain securities, the income from which is used for the purpose of establishing scholarship awards in the College of Law for worthy students from West Virginia. The value of each scholarship is \$250, and there are as many as four or five in operation concurrently. These awards are to be made to second- or third-year students who show

outstanding promise with respect to scholastic ability and attainment, moral force of character, and leadership.

George D. Hott Scholarship. George D. Hott, a 1927 graduate of the College of Law and a Morgantown attorney, has created a \$1,000 scholarship to be given annually to worthy citizens of West Virginia enrolled in the College of Law. This scholarship, which may be divided and given to not more than two recipients, is to be awarded to students on the basis of financial need and academic ability.

Stanley Preiser Law Scholarship. Stanley Preiser of the Charleston law firm of Preiser & Wilson has created a \$1,000 scholarship to be given annually to a student of the College of Law who has demonstrated outstanding potential for becoming a trial advocate.

Mr. and Mrs. Hayward E. Clovis Scholarship. Mr. and Mrs. Clovis of Parkersburg have created a scholarship to be given annually to a law student who has demonstrated financial need, academic ability, and who offers the promise of furthering the legal profession and the administration of justice upon the completion of his or her education.

Henry S. Cato Scholarship. The late Henry S. Cato, who practiced law for many years in Charleston, provided in his will for the creation of the Cato Scholarship of Law. This scholarship is given annually to not more than two students who are residents of West Virginia and who are in financial need of assistance.

Applications for scholarships must be submitted on forms which may be obtained from the Office of the Dean, College of Law, West Virginia University, Morgantown, WV 26506. Applications for each school year must be submitted and will be accepted for consideration between March 1 and July 1 preceding that year. Applications received after July 1 will be considered only in the event of a vacancy. Applicants for scholarships to be awarded to first-year students should take the Law School Admission Test by the February administration date in order that this data will be on hand for consideration of the application for scholarship.

Prizes

Arthur Ritz Kingdon, Jr. Memorial Law Prize. This cash prize is awarded annually to the first-year law student who attains the highest scholastic average in that class.

The fund which provides this prize was created by the family, classmates, and friends of Arthur Ritz Kingdon, Jr. and is to serve as a perpetual memorial. Mr. Kingdon entered the College of Law in the Fall of 1968, completed his first year and ranked first in his class. The prize memorializes the strength of character shown by such outstanding achievement in the face of extraordinary personal travail. Funds supporting the prize were supplemented in 1974 by gifts of friends memorializing the brother of Arthur Ritz Kingdon, Jr., Staff Sergeant Frederick W. Kingdon. Sergeant Kingdon was robbed and killed while serving in the Air Force in Southeast Asia.

James F. Brown Prize. James F. Brown, alumnus, "with a desire to stimulate the young men of the State to fuller consideration of the 'inalienable rights of mankind,' and especially those guaranteed by the Constitutions of the States and the United States," has contributed \$5,000 to the University, the income from which is to be "used as a prize for the best essay or paper each year on the subject of the individual liberties of the citizen as guaranteed by the Constitutions." The income may be given as a single prize, or it may be divided into a first and second prize. For the present the award is made as a single prize of

\$200. The subject for the essay for the current year may be obtained from the Secretary of the College of Law. Any regularly enrolled student within one year after receiving an undergraduate degree may compete for the prize. Graduates of the College of Law or the School of Medicine, or holders of any postgraduate degree, are not eligible to compete for the prize.

Nathan Burkan Memorial Prize. The American Society of Composers, Authors, and Publishers has established the Nathan Burkan Memorial Competition open to the leading universities and colleges of the country that offer courses in law. A prize of \$100 is available to each institution, to be awarded to the student in the graduating class in law who prepares the best paper on the subject of "Copyright Law."

Eastman Library of the American Arbitration Association Prize. This prize of \$500 was established in 1965 by the Eastman Library of the American Arbitration Association in honor of its founder — Lucius Root Eastman. The contest is open to any law student in a law school in the United States, for the best essay on some phase of commercial arbitration as it is practiced in the United States. The winning essay and others judged as qualifying will be published in the *Arbitration Journal*.

Awards

Tax Commission Prize. Five members of the State Tax Commission in 1902 — W. P. Hubbard, Henry G. Davis, John K. Thompson, L. J. Williams, and J. H. Holt — gave the sum of \$1,350, later increased by unawarded sums to \$1,500, the income from which is used annually as a prize for the "best original work bearing on matters of taxation in West Virginia." The conditions of the competition are determined by the Faculty Senate. The prize at present is in the amount of \$50.00. The subject for the essay for the current year may be obtained from the Secretary of the College of Law.

Tax Institute Award. The West Virginia Tax Institute has established a Tax Institute Award of \$100 to be made annually to the student in the College of Law who is judged by a faculty committee to have demonstrated the most interest and to have been most proficient in the study of tax law.

United States Law Week Award. A prize of approximately \$100 value is given to the graduating student in law who, in the judgment of the faculty committee, has made the most satisfactory scholastic progress in his final year. The award consists of a year's complimentary subscription to *Law Week*, which reports every week the important new court decisions and federal agency rulings, and all Supreme Court opinions.

West Virginia Law School Association Awards. The West Virginia Law School Association has established annual scholarship awards to such third-year member and such second-year member of the *West Virginia Law Review* as, in the judgment of the faculty of the College of Law, shall have made outstanding contribution to the *West Virginia Law Review*. The amount of each of these two annual awards is \$50.00.

Annual Corpus Juris Secundum Student Awards. West Publishing Company awards one selected title of *Corpus Juris Secundum* to the first-, second-, and third-year law student who has made the most significant contribution toward overall legal scholarship.

American Jurisprudence Prize Award Program. Lawyers Co-Operative Publishing Company and the Bancroft-Whitney Company award a specially bound title from *American Jurisprudence* to the highest ranking student in basic law school courses.

Loan Funds

West Virginia Law School Association Emergency Loan Fund. This fund is maintained for the purpose of aiding law students who, from time to time, need loans of small amounts in emergencies for short terms.

Student Activities

West Virginia Law Review

The *West Virginia Law Review* is published by the College of Law. Student contributions comprise about one-half the material published in the *Law Review*. Members of the second- and third-year classes with high scholastic standing are eligible for membership. Participation on the *Law Review* affords an opportunity for advanced, independent research.

Edward G. Donley Memorial Lectures

In 1954 a fund was established to provide a series of lectures to be delivered annually in memory of Edward G. Donley, distinguished graduate of the College of Law, (1899). The donors of the fund were his widow, Mrs. Eleanor T. Donley, and his son, Robert T. Donley. These lectures, given by an outstanding judge, lawyer, or law school teacher, deal with problems of law and jurisprudence not otherwise adequately covered in the College of Law curriculum.

Moot Court Team

The College of Law participates in the National Moot Court Competition sponsored annually by the Young Lawyers Committee of the Association of the Bar of the City of New York. The team of three students which enters the competition is composed of second- and third-year students selected on a competitive basis. In the spring a separate team takes part in the Philip C. Jessup International Law Moot Court Competition sponsored by the Association of Student International Law Societies in conjunction with the American Association of International Law. The WVU team successfully represented the United States in the 1973 competition and won the world competition. The team is open to upperclass law students and is selected on a competitive basis.

West Virginia Law School Association

The West Virginia Law School Association (successor to the College of Law Alumni Association) was organized and operates under a Constitution adopted May 31, 1958. Alumni, lawyers, judges, and law school faculty members are eligible for membership. The association promotes and sponsors programs and projects beneficial to the College of Law, the students, and the bench and bar. Membership fees and gifts are sources of funds for student awards, sponsoring the student moot court team in the National Moot Court Competition, arranging an autumn reception for first-year law students, maintenance of a revolving student loan fund for deserving law students in need of financial assistance, and other programs and projects. The association is governed by a board of governors of ten members and elected officers.

Student Organizations

Student Bar Association. All College of Law students are members of the Student Bar Association. The association is aimed primarily at developing an extracurricular program of legal education. It sponsors a speakers program, conducts an orientation program, and assists in placement of graduates. The association is nationally affiliated with the American Law Student Association, which is the law school adjunct of the American Bar Association.

Phi Alpha Delta. The William P. Willey Chapter of the Phi Alpha Delta law fraternity was established in 1925. One of 103 chapters of a national professional fraternity founded in 1902, the fraternity conducts a program of social and professional interest.

Phi Delta Phi. The Brooke Inn Chapter of Phi Delta Phi law fraternity was formed in 1922. Aimed at promoting higher standards of professional ethics and cultural achievement, Brooke Inn conducts social events with appropriate programs and speakers. An academic average of C+ or higher is required for membership.

Order of the Coif. A chapter of the Order of the Coif, a national law-school honor society, was established in 1925. Its members are selected by the faculty from the 10 percent of the senior class in the College of Law who at the end of the fifth semester rank highest in scholarship.

OUTLINE OF COURSE STUDY

First-Year Courses
(All Required)

First Semester	Hr.	Second Semester	Hr.
302 — Introduction to Law.....	2	315 — Moot Court.....	2
303 — Contracts I.....	3	304 — Contracts II.....	3
309 — Torts I.....	3	310 — Torts II.....	3
307 — Property I.....	3	308 — Property II.....	3
305 — Criminal Law.....	3	319 — Income Tax I.....	3
Orientation Lectures.....	0		
	14		14

Second-Year Courses
(Required Except As Noted)

First Semester	Hr.	Second Semester	Hr.
330 — Composite Subjects.....	12	Electives.....	13-16
Electives.....	3		
	15		13-16

Third-Year Courses
(Required Except As Noted)

First Semester	Hr.	Second Semester	Hr.
355 — Civil Procedure Practicum I*.....	2	359 — Civil Procedure Practicum II.....	2
Electives.....	11-14	342 — Lawyer's Professional Responsibility.....	1
		344 — Office Practice.....	1
		Electives.....	9-12
	13-16		13-16

*Civil Procedure Practicum is not required of those students who take Law 346, Practice Court.

In addition to requirements stated above, each student must, in the student's senior year, engage in one undertaking that involves a substantial writing effort. This requirement may be fulfilled by completion of: (1) Law 343, Research Seminar; (2) Law 356, Practice Court; (3) Law 357 or 358, Law Review Seminar; or (4) by preparation of a non-credit paper under the supervision of a sponsoring faculty member.

Note: Students who entered the College of Law in 1972 or earlier and who have interrupted their training career should inquire of the Committee on Curriculum and the Committee on Academic Standing for adjustment of their required courses for graduation. A three-year transitional change of the curriculum was inaugurated in the fall of 1972 and completed in the fall of 1974. Students who entered under a previous curriculum will have their programs adjusted to course offerings provided at the time of their return to law school studies.

Courses of Instruction

The following abbreviations are used in the description and schedule of courses:

- I — a course given in the first semester.
- II — a course given in the second semester.
- I and II — a course given throughout the year.
- PR — prerequisite.
- R — required.

302. *Introduction to Law I. I.* 2 hr. R. How controversies are resolved by the legal system; description of the court system, introduction to concepts of jurisdiction, problems of identifying issues and parties, relationships between judicial and administrative remedies. Orientation to use of law books. Selected materials.
- 303, 304. *Contracts I. I.* 3 hr. R. — *Contracts II. II.* 3 hr. R. Basic elements of consensual relations enforced by law: formation, remedies, impact of modern legislation upon common-law principles of substance and remedy in contract. Dawson and Harvey, *Cases on Contracts and Contract Remedies*, 2nd ed., *A.L.I. Restatement of Contracts*.
305. *Criminal Law. I.* 3 hr. R. Substantive law of crimes including (1) the philosophical basis for penal systems, (2) the characteristics of particular crimes, and (3) conditions of exculpation. Kadish and Paulsen, *Criminal Law and Its Processes*, 2nd ed.
307. *Property I. I.* 3 hr. R. The law of personal property to the extent it is not covered in other courses. The historical background of real property law. Estates in land; concurrent ownership of law; obtaining title to land through adverse possession. Casner and Leach, *Cases and Text on Property*, 2nd ed.
308. *Property II. II.* 3 hr. R. The elements of a modern land transaction and the respective rights and duties of the parties thereto. The creation of the landlord and tenant relation and the rights and duties of the landlord and tenant. Casner and Leach, *Cases and Text on Property*, 2nd ed.
- 309, 310. *Torts I. I.* 3 hr. R. — *Torts II. II.* 3 hr. R. Liability for intentional and unintentional acts. Includes assault and battery; false imprisonment; privileged acts; negligence; causation; strict liability; deceit; defamation, and invasion of rights of privacy. Gregory & Kalven, *Cases & Materials on Torts*, 2nd ed. 1969.
314. *Equity. II.* 3 hr. Study of the procedure, substance, and enforcement of equitable remedies, including injunctions, class actions, reformation, and rescission; protection against torts; specific performance of contracts; application of traditional principles of equity in a merged procedural system.

315. *Moot Court*. II. 2 hr. R. Appellate practice, preparation of an appellate brief and an argumentation of the brief.
319. *Income Taxation I*. II. 3 hr. R. Federal income taxation of persons and business enterprises. Gross income; deductions; tax accounting; gains and losses from dealing in property; forming, operating and liquidating business ventures. Surrey, Warren McDaniel & Ault, *Cases and Materials on Federal Income Taxation* (1972). *Income Tax Regulations; Internal Revenue Code* (Income, Estate & Gift Tax Provisions), latest editions.
321. *Accounting for Lawyers*. I. 2 hr. Elementry bookkeeping; application of sound accounting principles to the problems of periodic determination of income; inventory methods; valuation of tangible and intangible assets; depreciation and amortization, surplus and reserves; analysis of financial statements; and consolidated financial statements. Amory and Hardy, *Materials on Accounting*, 3rd ed. by Herwitz & Trautman w/1968 supplement.
324. *Pleading and Joinder*. II. 3 hr. Statement of claims; answers; replies; joinder of claims; joinder of parties; pre-trial objections to pleadings and to joinder of claims and parties. Selected materials.
325. *Constitutional Law*. I. 3 hr. Judicial review, federal and state relations, and individual rights under the United States Constitution, with emphasis on commerce, due process and equal protection, together with related materials on state constitutions and international law. Lockhart, Kamisar & Choper, *Constitutional Law — Cases, Comments & Questions*, 3rd ed. w/latest supplement.
327. *Evidence*. I. 3 hr. Rules, principles, and practice of the law of evidence, covering judicial notice, real, demonstrative, testimonial and circumstantial evidence, hearsay and other exclusionary rules, privileges, confidential relationships, witnesses and other related subjects. Proposed Uniform Rules of Evidence are integrated. Cleary and Strong, *Evidence, Cases, Materials & Problems*, 1st ed.
328. *Corporations*. I. 3 hr. Law of business corporations including formation of such corporations; corporate powers and their distribution between shareholders, directors and officers, and manner of exercising such powers; nature of fiduciary relations involved therein. Cary, *Corporations, Cases and Materials*, 4th ed., abridged.
330. *Composite Subjects*. I. 12 hr. R. A team-taught survey of general principles and basic information about a wide-ranging list of legal topics. Provides an essential understanding for a lawyer anticipating general practice. The central, controlling principles in such diverse areas as labor law, sales, corporations, zoning, admiralty jurisdiction, and others are included along with an identification of principal sources of authoritative exposition of the law on these topics. Selected materials.
333. *Property III*. I and II. 5 hr. Problems involving future interests emphasizing construction problems, powers of appointment, class gifts and rule against perpetuities; descent and distribution of property under intestacy laws; the law of wills; administration of decedent's estates. Simes, *Cases on Future Interests*, 3rd ed.; Leach, *Cases and Text on the Law of Wills*, 2nd ed. (1960 rev.).
335. *Trusts*. I. 3 hr. The trust, its creation and elements; transfer of a beneficiary's interest; administration of trusts; termination and modification of the trust; charitable trust; liabilities to and liabilities of third persons; resulting and constructive trust. Scott & Scott, *Cases on Trusts*. 5th ed.
340. *Conflict of Laws*. II. 3 hr. Legal problems arising when an occurrence cuts across state or national boundaries, emphasizing questions of characterization, jurisdiction, foreign judgments, recognition and application of foreign law in selected fields of law. Reese and Resenberg, *Cases and Materials on Conflict of Laws*. 6th ed.
341. *Practice and Procedure*. I. 3 hr. R. PR: Law 324. Fundamental phases of a civil action: process; appearances; dismissals; default judgments; discovery; pre-trial conferences; continuances; jury trials; trials by court; directed verdicts; instruc-

tions; arguments; jury deliberations; verdicts, new trials, relief from judgments. Cases, Text, Statutes, Rules and Forms.

342. *Lawyer's Professional Responsibility*. II. 1 hr. R. Professional responsibility in the administration of justice and in society. Code of Professional Responsibility, its requirements and considerations examined in light of traditional and changing demands on the legal system. Thurman, Phillips & Cheatham, *The Legal Profession — Cases and Materials* (1970).
343. *Research Seminar*. I. 2 hr. Seminars in various topics are offered each year. Sections are limited to no more than ten students. A substantial writing by the student is required under close supervision of the faculty member.
344. *Office Practice*. II. 1 hr. R. Practical problems in law office as distinguished from trial practice; but including law office phases of trial practice. Lectures by visiting attorneys in particular areas of practice. Text materials selected.
351. *Income Taxation II*. I. 3 hr. PR: Income Taxation I. Application of federal income taxation to partnerships and partners, corporations and shareholders in a planning context. Herwitz, *Business Planning*. Current ed. with latest supplement; Internal Revenue Code and Regulations.
352. *Jurisprudence*. II. 3 hr. Introduction to legal philosophy. Major jurisprudential issues; definition of law, concept of justice, relation of law and morality considered in light of specific legal theories and contemporary issues. Cairns, *Legal Philosophy from Plato to Hegel*, Harvard Law Review, *Introduction to Law*, Fortas, *Concerning Dissent and Civil Disobedience*, Wolff, Moore, & Marcuse, *A Critique of Pure Tolerance*, Zinn, *Disobedience and Democracy*.
353. *Estate and Gift Taxation*. I. 3 hr. PR: Third-year standing in College of Law. Application of federal transfer taxes (estate & gift taxes) and West Virginia inheritance tax; inter vivos transfers; joint interests; life insurance; valuation; exemptions, exclusions and deductions; marital deduction. Rice, *Federal Estate & Gift Taxation, Problems and Materials*, 2nd ed.; *Estate & Gift Tax Code and Regulations*, latest ed.
354. *State and Local Taxation*. II. 3 hr. Constitutional limitations; examination of specific taxes such as ad valorem, sales and use, business and occupation, and income taxes; tax exemptions; tax procedure; and new modes of financing state and local governments. Hellerstein, *State and Local Taxation*, 3rd ed.
355. *Civil Procedure Practicum I*. I. 2 hr. R. Teaching and practice sessions which take the student through the trial of a civil action, including interview of witnesses, formulation of a case theory, preparation of pleadings, use of discovery devices, presentation of opening arguments, examination and cross-examination of witnesses, drafting of instructions and motions and argument of the case to a jury.
356. *Practice Court*. II. 3 hr. PR: Pleading and Joinder; Practice and Procedure; Evidence. Students are given testimony which is similar to that of clients and witnesses. Having interviewed these student witnesses, counsel for each party select proper remedies and interpose appropriate defenses. Cases are litigated to final judgments.
357. *Law Review Seminar I*. I. 2 hr. Legal research, writing, editing involved in the production for publication of analytical and scholarly commentary on the law. Enrollment is limited to third-year students who are members of the *West Virginia Law Review*. Law 343 is waived for students taking Law 357 or 358.
358. *Law Review Seminar II*. II. 2 hr. Continuation of Law 357. Enrollment is limited to third-year students who are members of the *West Virginia Law Review*.
359. *Civil Procedure Practicum II*. II. 2 hr. R. Continuation of Law 355.
360. *Welfare Law*. II. 3 hr. Public social legislation designed to assure an adequate standard of living. Social Security, public assistance and general relief; study of rights and remedies of recipients. Part of the course is devoted to a clinical practicum. Course is limited to third-year law students who have prior approval of the instructor. Dodyk, *Income Maintenance: Cases & Materials*, latest ed.

361. *Criminal Procedure*. II. 3 hr. Initial appearance, bail, preliminary hearing, discovery, pre-trial motions, pleas, trial matters unique to criminal trials, post conviction relief. Selected materials.
362. *Federal Courts*. II. 3 hr. Jurisdiction and procedure in federal courts. Federal question and diversity jurisdiction; removal jurisdiction and procedure; the law applied in federal courts; venue, process, joinder of parties and actions, and trial of actions in federal courts. McCormick, Chadbourn & Wright, *Federal Courts, Cases & Materials*, 5th ed.
363. *Business Associations*. I. 3 hr. Types of business associations other than corporations. Conduct of business by agents, including the employment relation and workmen's compensation, is considered in some detail. Also considered are joint ventures, partnerships, unincorporated associations, joint stock associations, and business trusts. Seavey, Reuschlein & Hall, *Agency & Partnership*, 1962 ed.
364. *Administrative Law*. II. 3 hr. Comprehensive outline of agency procedures. Attention primarily to federal agencies. The administrative process itself, including operation of the Administrative Procedure Act, receives primary emphasis. Judicial and other outside controls of agency action. Jaffe and Nathanson, *Administrative Law Cases & Materials*, 3rd ed.
365. *Comparative Law*. II. 3 hr. Civil law systems and institutions as compared and contrasted with the common law, with particular emphasis being placed upon the French civil code. After reviewing and then comparing the histories of the civil law system and the common law system, some aspects of the civilian treatment of specific problems will be examined in detail. Von Mehren, *The Civil Law System*.
366. *Coal, Oil and Gas*. II. 3 hr. Nature of ownership of subsurface minerals; methods of transferring ownership thereof; partition among co-owners; analysis of leasehold estates, and rights and duties thereunder; coal mining rights and privileges. Williams, Maxwell & Myers, *Cases & Materials on the Law of Oil & Gas*, 2nd ed.
367. *Creditor's Rights*. II. 3 hr. Procedures for enforcing the rights of creditors. Individual procedures (execution, garnishment, suggestion, and creditors bills); fraud on creditors; collective procedures (general assignments, creditors' agreements and bankruptcy). Reisenfeld, *Creditors Remedies & Debtors Protection*. 1967 ed. with latest supplement.
368. *International Law and Public Order*. I. 3 hr. Public international law and its use in the conduct of international adjudication, international trade, and international policies, with an emphasis on recent United States experience. A number of specific real problems are examined with an eye toward legal considerations. Chayes, Erlich & Lowenfeld, *International Legal Process with Treaty Supplement*.
369. *Domestic Relations*. I. 2 hr. The law in its relation to creation, stability, and breakdown of domestic relations, including engagement, marriage, annulment, separation, divorce, alimony and support, custody, legitimacy, and adoption. Clark, *Cases on Domestic Relations*.
370. *Insurance*. II. 2 hr. Special problems and documents which revolve about the insurance contract in marine, life, fire, accident, disability, and liability insurance. Patterson and Young, *Cases and Materials on Insurance*, 4th ed.
371. *Labor Law*. I. 3 hr. Labor-management relations under the general jurisdiction of the National Labor Relations Board and the courts. Collective bargaining, administration and enforcement of labor agreements, and enforcement and protection of rights of employees, union, and public. Meltzer, *Labor Law — Cases, Materials and Problems*, 1970 ed. with statutory supplement.
372. *Legislation*. II. 2 hr. The legislative process; relation of legislative to judicial and executive branches; legislation and common law; legislative procedure; statutory interpretation; legislative drafting. Read, McDonald Fordham, *Cases and Other Materials on Legislation*, 2nd ed.

373. *Negotiable Instruments*. I. 3 hr. The law dealing with bills, notes, and checks is examined and the relationship of banks with depositors and with other banks; how commercial credit arrangements operate; how claims based on such arrangements are created and protected. Aigler & Steinheimer, *Bills and Notes*.
374. *Local Government Law*. II. 2 hr. Nature and function of local government, counties, cities, towns and villages, as well as permanent and *ad hoc* agencies and districts. Creation, annexation, dissolution, rights and duties, powers and liabilities, personnel, municipal finance. Selected materials.
375. *Suretyship*. I. 2 hr. General principles of surety and guaranty. The applicable section of the Statute of Frauds; surety's right before and after payment; surety's defenses including the use of set-off and counterclaim, alteration, and discharge. Simpson, *Cases on Suretyship*.
376. *Sales*. II. 3 hr. The sale of goods including formation and performance of the contract, warranties of seller, risk of loss, breach, fraud, buyer and seller, and financial arrangements connected with sale of goods. The focus is on Article Nine of the Uniform Commercial Code. Nordstrom and Cattin, *Problems and Materials on Sales and Secured Transactions*.
378. *Trade Regulation*. II. 3 hr. An anti-trust seminar, dealing generally with vertical and horizontal integration problems. Some of the legal limits upon the concentration of economic power in the United States. Areeda, *Antitrust Analysis Problems, Text, Cases*, 1967 ed. with Supplement.
380. *Legal Research*. 1 or 2 hr. as needed.
382. *Legal Clinic I*. I. 2 hr. Clinical practicum involving actual representation of indigent clients (no students) in both civil and criminal matters. Interviewing, legal research and writing, advising, and all phases of litigation under close and actual supervision of practicing lawyers. Open only to law students with third-year professional standing in the College of Law and with certification to Supreme Court of Appeals of West Virginia under special rule of Court.
383. *Legal Clinic II*. II. 2 hr. Continuation of Law 382.
389. *Law of Environmental Protection*. II. 3 hr. Problems of identifying and evaluating scientific evidence of air and water pollution; weighing the benefits of economic and technological progress against resulting harm to the quality of life; choice among alternative forms of private litigation and public regulation as methods of social control. Selected materials.
390. *Securities*. II. 3 hr. PR: Second- or third-year standing. A study of federal and state regulation of the distribution of and trading in securities and of investment companies includes the study of state Blue-Sky Laws and the various Federal Acts.
391. *Special Topics*. I, II, S. 2-3 hr. PR: Second- or third-year standing. Provides a variety of special arrangements for the presentation of subjects of timely importance in new and developing areas of the law or of contemporary importance.
393. *Intercollegiate Moot Court*. I, II. 2-4 hr. PR: Second- or third-year standing. Appellate brief writing and argumentation for members of intercollegiate moot court teams.

Part 10

INTERDEPARTMENTAL PROGRAMS

Committee on African Studies

Since 1967, the University has expanded its technical and academic competence regarding Africa from solely the agricultural sciences to include the social sciences and humanities. The Colleges of Arts and Sciences, Business and Economics, Human Resources and Education, and the Creative Arts Center, are involved in teaching and research in African and Africa-related subjects.

The Committee on African Studies was organized in 1969 to fulfill two basic requirements: (1) to blend the agricultural expertise of long-standing with the newer programs of study and research into unified course offerings and systematic research; and (2) to make available knowledge in the social sciences and arts concerning Africa to existing and prospective University programs of African technical assistance.

Moreover, it is within the committee's mandate to broaden its activities to include other parts of the world experiencing problems of development and human change similar to those of Africa. Although WVU programs have been related primarily to East Africa, they have a wider application. The concepts and philosophy developed in all of these activities can be utilized throughout Africa and, with suitable modification, could benefit other developing areas of the world, including the Appalachian region.

Academic Goals of Committee

Instructional Goals

The instructional goals of the committee are: (1) to provide an interdisciplinary competence in the teaching of the complex human and technological aspects of African development; and (2) to develop the procedural means for students in many fields readily to avail themselves of these interdisciplinary African and development studies.

Research Goals

The research goals of the committee are: (1) to provide interdisciplinary means through which contributions to the advancement of knowledge in African and development studies can be made by University faculty; and (2) to provide the opportunity for undergraduate and graduate students to pursue investigations, including field research.

Africana Library Collection

The Africana collection contains more than 6,000 volumes, exclusive of periodicals, and is capable of supporting undergraduate and graduate research up to and including the doctoral level within several natural and social sciences.

Academic Programs of the Committee

Degree Programs

The committee does not offer undergraduate or graduate degrees in African studies as such, but rather stimulates the interdisciplinary study of Africa and development by students who are formally associated with departments in the natural and social sciences and humanities.

In 1970, the graduate public administration program was expanded to include an option in development administration. In effect, the offering of this option allies the Committee on African Studies and its curriculum with the Public Administration Program. Graduates completing the option are awarded the Master of Public Administration degree, with an interdisciplinary concentration in the area of African and development studies.

Special Academic Programs and International Study

The committee provides opportunities for special non-degree study in Africa-related subjects and is working to develop international study programs in Africa for University faculty and students.

African Speakers Program

For several years, the University has brought speakers on Africa to the campus. This program will be expanded by the Committee on African Studies.

Further information concerning the Committee on African Studies and its program may be obtained from:

*Newton M. Baughman
Office of International Programs
212 Agricultural Sciences Building*

*Rodger D. Yeager
Department of Political Science
311 Woodburn Hall*

Research and Fellowship Programs

The University, through the Office of International Programs, is sponsoring field research projects in East Africa, for faculty within the natural and social sciences and humanities. It is the Committee's intention to enlarge these opportunities and especially to provide interdisciplinary facilities for student field research at the graduate level.

African and Related Graduate Courses of Study

COLLEGE OF AGRICULTURE AND FORESTRY

Division of Animal and Veterinary Sciences

AI&VS 420 — Special Topics

VS 497 — Research

Faculty of Agricultural Biochemistry

Agr. Biochem. 320 — Special Topics

Agr. Biochem. 497 — Research

Division of Forestry

Forest Management 470 — Special Topics

Division of Resource Management

Agr. Econ. 211 — Rural Economic Development

COLLEGE OF ARTS AND SCIENCES

Department of English

English 286 — Black American Fiction

Department of Geology and Geography

Geogr. 246 — Geography of Africa

Department of History

Hist. 229 — History of Africa: Pre-Colonial Africa

Hist. 230 — History of Africa: European Dominance and Independence

Hist. 251 — History of Black People in America to 1900

Hist. 252 — History of Black People in America Since 1900

Hist. 426 — Seminar in African History

Department of Political Science

Pol. Sci. 258 — Politics of Africa

Pol. Sci. 290 — Socio-Politics of Africa

Pol. Sci. 295 — Politics of Planned Development

Pol. Sci. 391 — Leadership and Authority in Africa

Pol. Sci. 394 — Theory of Political Development

Pol. Sci. 459 — Seminar in Comparative Government

Department of Sociology and Anthropology

S.A. 223 — Sociology of Rural Life

S.A. 240 — Social Change

S.A. 241 — Population and Dynamics

S.A. 251 — Cultural Dynamics

S.A. 253 — Cross-Cultural Studies in Development

S.A. 290 — Special Topics in Anthropology

COLLEGE OF BUSINESS AND ECONOMICS

Econ. 210 — Comparative Economic Systems

Econ. 213 — Economic Development (Same as Agr. Econ. 213)

Econ. 375 — Economic Development

Econ. 379 — Seminar in Economic Development

CREATIVE ARTS CENTER

Division of Music

Music 230 — Music of Africa

COLLEGE OF ENGINEERING

Agr. Eng'g. 497 — Research

COLLEGE OF HUMAN RESOURCES AND EDUCATION

Division of Education

C&I 270 — Special Problems in Comparative Education

Center for Appalachian Studies and Development

The pioneers in the land-grant movement intended to establish institutions through which knowledge and learning would become an effective part of the daily lives of the American people. West Virginia University is such an institution.

The WVU Appalachian Center helps mobilize special efforts of private and public agencies; to extend and organize WVU resources to provide lifelong educational opportunities for more people; to assist young people through youth development programs to realize their potential; and to develop, gather, index, and disseminate knowledge.

The Center emphasizes the sharing of knowledge and providing insights about processes and systems of decisionmaking so that public and private leaders may make better-informed choices in individual, family, community, and government life. It recognizes the importance of planning programs centered on community, area, and statewide problems.

Field offices in each of the state's fifty-five counties and six area offices are integral parts of the Center and the University. These Extension offices assist agencies and organizations in carrying out programs which support statewide development goals.

Division of Social and Economic Development

The Division of Social and Economic Development offers research and educational programs providing information intended to further the social and economic development of West Virginia. The Division includes Business Extension, Clergy and Cultural Education, Fire Service Extension, the Institute for Labor Studies, the Office of Research and Development, and the Water Research Institute.

The Business Extension program is offered in cooperation with the College of Business and Economics. This program offers educational programs designed to meet the management information needs of the large, medium, and small enterprises in the state.

Programs aimed at meeting church and community leadership needs of the clergy and cultural education programs concerned with West Virginia's cultural heritage are offered by Clergy and Cultural Education.

Training for West Virginia's fire fighters is offered by Fire Service Extension. The fundamentals of fire suppression are taught in basic, advanced, and regional schools conducted throughout the state. In addition to fire suppression training, programs for fire department officers and instructor training programs for training officers and field instructors are also offered. A training center located in Morgantown offers facilities for fire-training and fire-extinguishment research.

The Institute for Labor Studies conducts educational and research programs for workers and their organizations. Subject matter ranges from skill courses, such as steward training, collective bargaining, work measurement, union administration, job evaluation, and contract administration, to a liberal arts curriculum covering such subjects as labor and economy, labor and government, labor and society, and labor history. Research ranges from collective bargaining studies, to attitude surveys, to economic analysis.

The Office of Research and Development has special responsibility for the design and conduct of interdisciplinary research projects concerned with the social and economic problems of the state as well as providing research and evaluation of existing extension programs.

The program of the Water Research Institute is designed to obtain knowledge needed to gain the greatest benefit from the water resources of West Virginia. Research involving faculty members and graduate students is done on projects centered in several departments of the University.

Division of Agriculture, Forestry, and Community Development

The Division of Agriculture, Forestry, and Community Development has five structured program units: Animal Sciences, Plant Sciences, Forestry, Resource Management, and Community Development. Each program unit conducts educational programs and provides technical assistance in a complementary manner to enhance rural development in West Virginia.

The primary objective of the Division is to collect, translate, and diffuse knowledge to clientele that has been generated by colleges within West Virginia University and similar institutions and organizations in West Virginia and neighboring states. Many opportunities exist for undergraduate and graduate students to support local program activities in a variety of subject matter areas.

Areas of specific interest to the Division in pursuit of its educational objectives are: (1) improvement of animal and crop production through breeding and management; (2) improvement of pasture and forage production levels; (3) proper utilization of land and conservation of land and natural resources; (4) economical weed and pest control techniques; (5) environmentally and economically sound forestry production, harvesting, and utilization schemes; (6) maintenance of air and water quality; (7) expansion of animal and solid waste management programs; (8) expanded outdoor recreation and tourism programs; (9) improvement of the leadership and decision-making capabilities of adult and youth community groups, organizations, agencies, and public officials to enhance their efforts to secure better housing, transportation, social services, water and sewage systems, recreational facilities, and local government; and (10)

more complete identification of resources available for community and rural development.

Division of Personal and Family Development

The goal of the Division of Personal and Family Development is optimum human development — the realization of self in society. Programs focus on ability and skill in decisionmaking, interpersonal relations, effectiveness of community participation, and development by the individual of a basic set of beliefs and values which give meaning to life.

The division's work is conducted through two program units: (1) Extension Education Programs for Women, (2) Expanded Food and Nutrition Program that provides aides to work with low-income families.

Division of 4-H — Youth Development

The overall mission of the 4-H — Youth Development Division in conducting 4-H youth programs is the development of youth individually and as responsible and productive citizens. The program provides opportunities for development through organized 4-H clubs, 4-H Special Interest Groups, 4-H TV Clubs, camps, and some individual approaches.

The "learning to do by doing" approach has, since the inception of 4-H, been largely accomplished through the individual project. Youth, today, may choose from more than 100 different projects to select one or more to meet his/her needs and interests. Project offerings include photography, electricity, all phases of agriculture and home economics, forestry, conservation, entomology, handicraft, bicycle, safety, and many more. The project concept has broadened to include group projects such as fire fighting.

Special interest groups provide an opportunity for young people to participate in a sustained educational learning experience on a topic vital to them but not necessarily become involved in an organized club. Automotive safety is an example.

Education through camping is one of the major thrusts of the Division. In addition to one or more weeks of county 4-H camps being conducted annually in each county, special interest camps are conducted which include interest areas such as self-understanding, career development, cultural heritage, citizenship, community development, recreation, junior leadership, opportunity camps, and others.

A special 4-H educational program focused on career development is being conducted in two urban areas; another provides food and nutrition education for disadvantaged youth in eleven densely populated areas; and a third special program on 4-H/Community Development is conducted in rural areas of the state.

Division of Information and Educational Technology

The Division of Information and Educational Technology assists staff members of the Appalachian Center in developing and using teaching materials which utilize the advances that have been made in educational technology. The division also is involved with the preparation of subject matter and public affairs programming for radio, television, newspapers, and publications.

Division of Off-Campus Credit and Continuing Education Programs

This Division coordinates the WVU graduate and undergraduate off-campus course offerings and the Continuing Education Unit (CEU) Program.

Graduate Courses

Approximately 100 graduate-level off-campus courses are offered each semester at different locations. All courses (graduate and undergraduate) must be approved by the respective Department Chairperson, Academic Dean, and the Division Leader for Off-Campus Credit Programs. In addition, graduate-level courses must be approved by the Graduate School Dean. Students taking off-campus courses for credit must satisfy all requirements for admission to the University and, before registering, must file with the WVU Dean of Admissions and Records complete official transcripts of record. A fee of \$14.00 per semester hour and a \$20.00 off-campus enrollment fee are charged for each off-campus, graduate-level course offered.

It is the responsibility of students to ascertain from the appropriate college and department specific requirements established to earn a degree. This not only includes the specific classes but work that needs to be done in residence study on the Morgantown campuses.

Undergraduate Courses

West Virginia University operates an off-campus undergraduate center at Greenbrier East High School at Fairlea, Greenbrier County. Generally, students may earn enough credit to satisfy freshman requirements. Selected courses also are offered at the Alderson Reformatory for Women, the Kennedy Youth Center, and where expressed needs cannot be met by local colleges.

A fee of \$12.00 per semester hour and a \$12.00 off-campus enrollment fee are charged for each off-campus undergraduate course offered.

Library Resources

Library and laboratory facilities for off-campus courses must be approved by the Division Leader for Off-Campus Credit Programs and, in case of courses for graduate credit, by the Graduate School Dean. Books for use by off-campus students may be borrowed from the WVU Library upon the order of the Division Leader for Off-Campus Credit Programs, subject to the approval of the Library Committee. Postal charges must be paid by the individual or groups for whom the books are borrowed.

Continuing Education Unit Program

Recognizing the importance of continuing education, WVU has adopted the Uniform Measurement System recommended by the national task force coordinated by the National University Education Association. The Continuing Education Unit (CEU) may be used for the measurement, recording, accumulation, transfer, and recognition of participation by adults in programs which seldom in the past have been recorded in a systematic way or with any sense of permanence, significance, or transferability. The unit can be applied with equal facility to professional continuing education, vocational retraining, and adult liberal

education, as well as all other programs in adult and continuing education. The assignment of CE Units to a WVU-sponsored educational activity is the responsibility of the Division Leader for Off-Campus Credit Programs.

For further information, write to the Division Leader for Off-Campus Credit Programs, 204 Coliseum, West Virginia University, Morgantown, WV 26506.

Life Sciences

Genetics and Developmental Biology

Dr. Valentin Ulrich, 1096 Agricultural Science Building.

Research Areas — Biochemical genetics, developmental genetics, cytogenetics, quantitative genetics, human genetics, forest genetics, molecular aspects of development, experimental morphogenesis, teratology, regeneration, oncology, descriptive embryology, life cycles of animals and plants, and host-parasite relationships.

Reproductive Physiology

Dr. E. K. Inskeep, G016 Agricultural Sciences Building.

Research Areas — Physiology of spermatozoa; fertility and viability of aged ova; regulation of the life span and function of the corpus luteum; effects of light and other environmental factors on reproduction; physiology of uterine contractions; dietary mineral levels and reproduction; endocrinology and metabolism; role of gonadotropic hormones in control of steroidogenesis; control of estrus and ovulation and use of artificial insemination in beef cattle, swine and sheep; and physiology of intrauterine contraceptive devices. The members of the Faculty of Reproductive Physiology and their research facilities are located in various departments: Anatomy; Animal Science; Biology; Genetics; Internal Medicine; Pharmacology; and Obstetrics and Gynecology.

Rigid statements concerning academic requirements for graduate studies in the biological sciences cannot be made. The faculty of each program sets its own requirements, details of which may be obtained from the appropriate chairperson of the department or faculty. In general, students with good academic records with majors in the agricultural and medical sciences and in chemistry, physics, and mathematics are desirable applicants. All students should be prepared in mathematics, biology, and chemistry — especially the latter. Potential graduate students are urged to take both the aptitude and advanced tests of the Graduate Record Examination during their senior year as undergraduates. It is advisable to prepare for the foreign language requirements for the Ph.D. degree by taking undergraduate courses in French or German.

A general application form may be obtained from the Dean of the Graduate School. Inquiries concerning individual programs, financial assistance, departmental requirements, and professional career opportunities should be sent to the appropriate departmental or program chairperson as listed.

INDEX

A

Abbreviations 51
Absences 25
Academic information 17
Accounting 146
Accreditation, WVU 8
Administrative officers 7-8
Admissions, graduate 18; law 357;
 medical center 24
Advanced study certificate 205, 208
Adviser 21
Aerospace engineering 169
African studies 373
Agricultural biochemistry 54
Agricultural economics 68
Agricultural education 70
Agricultural engineering 172
Agricultural mechanics 71

AGRICULTURE 53, 47

Agricultural biochemistry 54
Agricultural economics 68
Agricultural education 70
Agronomy 64
Animal and veterinary sciences 56
Bacteriology 65
Biochemistry 54
Economics 68
Education 70
Entomology 66
Forest engineering 175
Forestry 58
Genetics 66, 382
Horticulture 67
Landscape architecture 72
Mechanics 71
Plant pathology 67
Plant sciences 63
Recreation 58
Resource management 68
Wildlife 58

Agronomy 64
Aliens 14, 21
Anatomy 321
Animal and veterinary sciences 56
Anthropology 129
Appalachian Center 376, 49
Art 161, 48

ARTS AND SCIENCES 73, 47

Astronomy 113
Biology 73, 387
Chemistry 77
Computer science 135, 137
English 81
Foreign languages 87
Geology and geography 91
History 96
Humanities 103
Library science 103
Mathematics 105
Philosophy 109
Physics 110
Political science 113
Psychology 120, 204
Public administration program 126
Religious studies program 129
Sociology and anthropology 129
Speech communication 133
Statistics 135

Assistantships, fellowships,
 traineeships 47

Astronomy 113

Auditing (courses) 42

B

Bacteriology, agricultural 65
Basic Sciences, Medical Center 321
Biochemistry, agricultural 54; medical
 322
Biology 73, 387
Biophysics 327
Board of regents 4, 10
Business administration 141

BUSINESS AND ECONOMICS 141, 48

C

Calendar, WVU 3
Candidacy for degrees 22, 32
Certificates, graduate 205, 208
Cheating 35
Chemical engineering 175
Chemistry 77
Civil engineering 179
Classics 88

Clinical Studies 206
 Counseling and guidance 206
 Reading 234
 Rehabilitation counseling 206
 Special education 213
 Speech pathology and audiology 216
 Commencement 28
 Completion requirements for degree 23
 Computer center 13
 Computer science 135, 137
 Copy centers 26
 Counseling and guidance 206
 Courses of instruction
 graduate 51
 professional 303, 321, 329, 357
 CREATIVE ARTS CENTER 147, 48
 Art 161, 48
 Drama 163, 48
 Music 151, 48
 Credit information 23
 Curriculum and instruction 223

D

Daily Athenaeum fee 40
 Dance 270
 Degrees 28-34

DENTISTRY 303

Dissertations 26, 33
 Doctor of education 34, 201
 Doctor of musical arts 34
 Doctor of philosophy 31

DRAMA 163, 48

E

Economics 142, 146
 Agricultural 68

EDUCATION 203, 219

Educational psychology 230
 Electrical engineering 186
 Elementary education 223
 Employed graduate students 23

ENGINEERING 167, 48
 Aerospace 169
 Agricultural 172
 Chemical 175
 Civil 179
 Electrical 186
 Experiment station 48
 Forest 175
 Industrial 191
 Mechanical 196
 Mining 257
 Petroleum 257
 Theoretical and applied mechanics 197
 English 81
 Entomology 66
 Examinations 20, 27, 33
 Executive committee, graduate school 17
 Expenses 37
 Extension 23, 38, 379

F

Faculty 283, 303, 345, 357
 Family resources 241

FEES AND EXPENSES 37-47

Fellowships, assistantships, traineeships 47
 Final examinations 27, 33
 Finance 149
 Financial aids, student 18, 47
 Foreign languages 87
 Foreign students 14, 21
 Forest engineering 175
 Forestry 58, 47
 French 88
 Full-time student 40 (footnote 1)

G

General regulations 20
 Genetics 66, 380
 Geology and geography 91
 German 89
 Government of WVU 10
 Grading 24-25

Graduate Catalog 21
Graduate record examination 20
Grants 47
Greek 88

H

Health education 226, 232
Health service fee 39
History 96
Home economics 241
Horticulture 67
Housing, student 6, 12
Humanities 103

HUMAN RESOURCES AND EDUCATION 203, 48

Clinical studies 206
Education 203, 219
Family resources 241

I, J, K

Industrial engineering 191
Industrial relations 144, 149
Interdepartmental programs 373
African studies 373
Appalachian center 376
Life sciences 380

JOURNALISM 247, 48

Kent fellowships 49

L

Laboratory fees 38
Landscape architecture 72
Languages, foreign 87
Latin 88

LAW 357

Library science 103
Library, WVU 12
Life sciences 380
Genetics 380
Physiology 380

Linguistics 90
Literature 81

M

Management 150
Marketing 150
Master of arts 31, 28-31
Master of science 31, 28-31
Mathematics 105
Mechanical engineering 196

MEDICAL CENTER

Admissions 24
Anatomy 321
Basic sciences 321
Biochemistry 322
Conjoined courses 323
Dentistry 303
Fees 37-47
Library 12
Medical technology 253
Medicine 329
Microbiology 324
Orthodontic program 317
Pathology 325
Pharmacology 326
Pharmacy 263
Physiology and biophysics 327
Medical science grants 48
Medical technology 253

MEDICINE 329

Microbiology 324

MINERAL AND ENERGY RESOURCES 257

Minerals 257
Minors 45
Morgantown 11
Mountainlair fee 40

MUSIC 151, 42, 48

N

Nonresident student 44

NSF fellowships, traineeships 49
Numbering courses 51

O

Oak Ridge fellowship 50
WVU off-campus courses 23, 379
Orthodontic program 317
Out-of-state students 44

P

Part-time student 40 (footnote 2)
Pathology 325
Petitions 21
Petroleum engineering 257

PHARMACY 263

Philosophy 109
Philosophy, doctor of 28-31

PHYSICAL EDUCATION 265, 49

Dance 270
Physical Education 267
Safety 268
Sport studies 267

Physics 110
Physiology and biophysics 327, 380
Plant pathology 67
Plant sciences 63, 387
Political science 113
Probation 26
Psychology 120, 204
PHS fellowships 50
Public administration program 126

R

Reading 234
Recreation 58, 62
Refunding of fees 43
Regents, board of 4, 10
Regional research institute 49, 390
Registration 22
Rehabilitation counseling 206
Religious studies program 129
Remission of fees 42

Request for degree 28
Requirements for degrees 31
Research grants 47
Residential status 44-47
Resource management 68
Russian 89

S

Safety 268
Scholarship 25
Secondary education 225
Semester fees 37-47
Seniors doing graduate work 21

SOCIAL WORK 273, 49

Sociology and anthropology 129
Spanish 91
Special education 213
Special fees 37
Speech communication 133
Speech pathology and audiology 216
Sport studies 267
Statistics 135
Stipend payment dates 50
Summer session 3; fees 38
Suspension 26

T

Teacher-librarians 227
Teaching grants 47-50
Technology education 225, 233
Theoretical and applied mechanics 197
Theses 26
Traineeships, fellowships,
 assistantships 47
Transfer credit 23

U, V, W

University hospital 333
University senate 10
Veterans 14, 6
Veterinary science 56
Wildlife management 58
Wood science 61
WVU Foundation fellowships 49



West Virginia University cultural attractions encompass all the arts — ranging from internationally recognized artists to the expertly done productions of the Creative Arts Center. Monthly and weekly calendars of WVU events carry listings of exhibits, lectures, plays, concerts, operas, film classics, and other cultural events.

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Human history becomes more and more a race between
education and catastrophe.

—H. G. Wells

